An Introduction to Language Description

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By

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PREFACE

The study of language has no peer in the human sciences. As our species' distinctive attribute, language is the gateway to the mind, its symbolic facilities, and, indeed, what it is to be human. This prospect of gaining access to the essence of human behavior in all of its manifold complexity, however exciting, was actually not what drew the author to the study of language. In fact it was his inability to master language as a subject. English grammar presented in secondary school was a series of puzzling parsing diagrams; Latin (offered as an academic treat) was a series of mostly erroneous struggles to translate seemingly abstruse passages; and German in college, with its attendant presentation of German speech sounds (as well as grammar) by an infinitely patient but perpetually disappointed professor, simply served to cement the realization that "language" was best avoided as too forbidding or too difficult for an otherwise reasonably competent student. This is, I suspect, not an uncommon orientation for many students; it was certainly not an auspicious beginning for someone who would wind up studying language as a profession.

However, the chance registration in the anthropological linguistics courses offered by Professors Harry Hoijer and, later, Mary Woodward and Jeannette Witucki provided the liberating appreciation that language was patterned! Not mysterious, seemingly random, collections of aphorisms easily confused and forgotten, but instead patterned activity organized by comprehensible sets of rules. And even more intriguing was the realization that these rules could be discovered by careful observation and the application of analytic procedures. For a young student, attracted by the promise of empirical investigation of human behavior, this was a powerful revelation. But above all, a part of the human experience that had seemed so foreign and out of reach, was made accessible. Language could be comprehended, and this is what the text seeks to impart to the reader.

This text is an attempt to introduce the basic systems of language and how these can be investigated and described. The systems of organizing speech sounds (phonology), meaning (lexical semantics), and grammar (morphology and syntax) are described along with methods of figuring these out for other languages. The goal is to have the reader appreciate (hopefully with the same excitement) that language is patterned and that these patterns can be discovered. To this end, problems using actual

language data are presented at the end so the reader can apply the methods described in the chapter.

Further, it is important to understand that language structures are not simply abstract puzzles divorced from actual human speech communication. Throughout each chapter references are made to humans speaking and choosing among structural elements. This will hopefully ground the presentation in the realities of speech, a reality that each reader shares as a language user.

I would like to express my deep appreciation to my colleague Zhiming Zhao (formerly of the State University of New York, College at Geneseo). Our many hours of discussion, and argument, about language topics were greatly stimulating and contributed to the value of the present work. Indeed, several parts of Chapters 1 and 2 are the direct result of suggestions and phrasing of Dr. Zhao. I would also wish to thank St. John Fisher College for two sabbatical leaves during which most of the writing was accomplished. Finally I dedicate this book to Mariana, Kimberly and Tom who supported the work of a sometimes preoccupied husband and father.

Rochester, NY
2013

CHAPTER ONE

INTRODUCTION

Linguistics is the study of human communication. This chapter will introduce the subject of linguistics by describing the skills and knowledge necessary to engage in the most common and important form of human communication—speech. Our example will be a simple conversation, and the skills needed to engage in it include not only the physiological skills of speaking (and hearing) but also, and more importantly, several mental skills of organizing speech sounds into appropriate sequences. In addition, there are the knowledge skills of how to converse with another person by selecting particular topics and styles of speaking. The chapter concludes with a discussion of the place of linguistics within the human sciences, in particular anthropology—the significance of the study of language for an understanding of humans, language and human evolution, language in relation to primate communicative capabilities, and a description of four linguistic sub-fields.

The Complexity of Ordinary Conversation

Imagine the following scene: two ordinary adult members of a community meet on the street and engage in a short conversation. They exchange greetings, discuss an upcoming community event, say goodbye and part. There is certainly nothing unusual about this—it occurs continuously in all communities as a common form of interaction. Yet the set of behaviors which take place during this event represent the most complex phenomena known to behavioral scientists. This may seem to be an overstatement. After all, each of you have performed a similar activity innumerable times and I am sure you would believe that it requires little or no skill. In fact, I suspect that often you have done this while you were engaged as well in doing something else—thinking about a subsequent activity, keeping a pile of books in your grasp, chewing gum. However, the ability to converse and do one or more activities at the same time is not proof of the simplicity of conversation, but rather proof of the considerable and unequalled complexity of human cognitive and motor capabilities. To demonstrate this, let's consider all that our two adults must be able to do in order to adequately conduct their conversational interaction.

The Importance of Mental Skills

Before we start, however, we must examine a few basic assumptions. We will be unable to observe most of the abilities to be discussed. Their presence can only be inferred by other evidence than by just watching the conversation take place. These abilities are "knowledge" skills (such as the capability to use values, beliefs and meanings) and are considered to be part of the mind—the cognitive operations of the brain.

These are crucial abilities. Without them, the physiological skills of speaking and hearing would be insufficient for our two adults to converse. If we were to replace one of the adults with another, of equal physiology but of different cognitive abilities (i.e. of a different culture), then the conversation would not be adequately conducted to either adult's satisfaction. They would simply not be able to greet each other, discuss something, or part in a manner that would be mutually intelligible. Another indication of the primacy of cognition is that humans are not restricted to speaking and hearing in order to communicate. Humans can also manifest their communicative signals in visual ways such as reading/writing and signing (a system of gestural signals used by the hearing impaired) and in tactile ways such as reading by Braille (raised dots felt by the fingertips). What is basic to human communication, then, is the cognitive capability to organize signals in a distinctively complex manner, not a particular mode of signaling. The scope of this book, however, will be limited to the mode of speaking (and hearing) since from an anthropological perspective speech is the basic mode of communication in human communities.

The Physiological Skills for Speaking: Phonetics

We will begin with the physiological abilities necessary for conversing. Speaking involves a very large number of physiological activities. Taken together, these activities are referred to as **articulation**. (And remember, we are only discussing an ordinary conversation, not some special tour-de-force of vocalization as might be produced by the lead singer in an especially energetic rock group, or the rapid-fire delivery of a professional auctioneer.) Articulation requires that the movements of hundreds of muscles, connected to many different organs and bones, be rapidly coordinated. In speech, the flow of air into and, especially, out of the lungs is continuously modified (in a manner, it should be noted, different from the rhythms of breathing). The flow of air from the lungs is further modified by rapidly changing configurations of the organs of the throat and mouth such as the lips and tongue. These are not only rapid and continuous, but multiple, which means that several configurations occur at

the same time in different portions of the vocal tract. One of the important occurring features of articulation is the "melody" of speaking—particular sequences of different pitch and loudness as well as patterns of pauses. The study of human articulation, including the methods of describing it in a useful manner, is called **phonetics**.

The Cognitive Skills for Speaking: Phonology

These complex articulatory events do not just happen as a result of the presence of the necessary physiological equipment, such as is the case for breathing or mastication and swallowing. They must be produced and organized by a cognitive system learned by the speaker. A speaker must learn to make certain kinds of sounds, rather than just any of the large number of sounds that are possible with the human vocal tract. Moreover, the speaker must learn to modify these sounds in particular ways when they are used in certain sound environments. Also, the speaker must learn how to use the sounds in combinations with other sounds. Not all combinations, however possible just on an articulatory basis, are permitted within the system of sound combinations learned by the speaker. The "melody" of speaking, in particular, will be learned such that a speaker produces certain variations of pitch and loudness rather than random variations. By the same reasoning, speakers will not employ a monotone of equally loud, pitched and evenly spaced units of sound (unless, of course, they have learned that this conveys a desired message to the hearer—among U. S. English speakers, for example, this might be boredom or restrained anger).

Linguists refer to the study of this cognitive system as **phonology**. We will take a certain terminological liberty for the sake of convenience and refer also to the cognitive system itself as "phonology." The same fiction will be used for each of the cognitive systems described below. Instead of having to state, for example, that "linguists who have done a phonological study of the X group of speakers have come to the conclusion that these speakers must have a cognitive system which produces the following kinds of sounds:...," we can simply state "the phonology of X language contains the following kinds of sounds:. . . ."[1] Speakers possessing different phonologies will use their common human vocal tract organs to produce and use different kinds of speech sounds (although it should be noted that there will be many similarities among the world's languages).

[1] Many linguists (the author included) use the term phonemics, or phonemic analysis, for the method of studying the cognitive system of sound production, and the term phonology for the system itself.

The Cognitive Skills for Speaking: Semantics

Sounds, however well-formed and acceptably combined, are really not the point of speaking—it is the use of these sounds to communicate. Sound groupings are signals which are normally produced to elicit a particular shared meaning in the mind of a hearer. Therefore, a further necessary cognitive skill is to be able to understand and use the meanings of the thousands of sound group signals required for ordinary adult conversation.

This should not be thought of as just a sort of mental dictionary with individual signals listed with their individual meanings. While these units of meaning may be used singly as complete conversational elements, their natural habitat is in combination with other such units and the result is rarely simply the sum of the meanings of the units but instead a function of the particular interplay among these constituent meanings. A speaker must be able to deal with the practically limitless, and often new, combinations of meanings that occur. And not just within the same sentence or phrase, but as constructed over a whole conversation and even many conversations. In addition, our speakers' abilities to use meaning units will depend upon understanding such relationships among meanings as synonymy, analogy, taxonomy, and the applicability of certain meanings with certain real world situations—i.e. relevance and truth. These skills of knowing and using meanings are referred to as **semantics** by linguists.

The Cognitive Skills for Speaking: Pragmatics

This last aspect mentioned above, the relationship between speaking and the external context of speaking, requires another ability. Our two adults do not possess just one way of speaking. They would, for example, undoubtedly have formal and informal manners of speaking (called **speech varieties**) and we could suppose that, as they are speaking in a public setting (a street), the formal variety might be more appropriate than the informal variety. The actual "rules" for variety selection would be a necessary cognitive skill for a speaker. There are typically several varieties available to adult speakers (from versions of the same language, to completely different languages, as in a bilingual community) and choosing a variety is related to such factors as the intentions of the speakers, their sex and relative age, their social relationship and the topics they are using, among others. In addition to variety selection, there are the skills of structuring a conversation involving such skills as who talks first, interruptions, topic changes and silences, and many others. These skills of organizing conversational interaction are referred to as **pragmatics** by linguists.

Pragmatics covers a wide range of topics, from the language choices of bilingual speakers to a parent's timing of interruptions of a child's explanation of a misdeed. Since a good part of pragmatics is as much a system of interpersonal interaction within a society (dealing with such various phenomena as male-female relationships, dominance and subordination among social superiors and inferiors, self-defense and self-aggrandizement, interactional play and manipulation—or, in other words, matters of social and cultural anthropology) as it is part of the system of producing and organizing speech signals, we will not deal with pragmatics as a separate topic. Instead, the role of speaking within a system of societal constraints will be limited to a discussion of the study of the system of choosing which speech variety to use under which social circumstances. This topic will be discussed further under the heading "sociolinguistics" below.

The Cognitive Skills for Speaking: Grammar

There are still other skills required of our two speakers. The units of meaning ("words" will do for now as a term for these units) themselves will likely be organized as particular combinations of smaller units of meaning, and words must then be combined in particular ways into groups which form sentences and phrases. These skills of forming and organizing words are called **grammar** by linguists, divided into the cognitive abilities to make words (**morphology**) and make phrases and sentences (**syntax**). You might object that these do not appear to be much different from semantic abilities. Morphology and syntax certainly have semantic results, but they are not the same skill as semantic organization.

The difference between semantics and grammar may not be readily apparent even with an example from the reader's own language because it seems natural that a particular meaning be represented by a particular word arrangement. Three kinds of experiments should convince you that speakers can combine the sound group signals (parts of words and words themselves) only in restricted ways if they are to successfully communicate—even if all the necessary semantic elements are present. First, you could try some rearrangements of signals and see if they retain their meaning effectively. (In English, for example, try "windun" for "unwind", "lyishboy" for "boyishly", or "man old my" for "my old man".) Second, you could compare the way you put words together with the way you construct words to see if they are structurally and semantically consistent. (For example, in English we use phrase structures such as "the plural of book" or "more than one book" where the words indicating plurality precede the word to be pluralized but when we construct a plural word such as "books" the part of the word indicating plurality follows the

word. “Book more than one” has a different meaning and “sbook” has no effective meaning even though in both all the semantic signals are present.) A third way to demonstrate the crucial role of grammar is to attempt to translate some word or phrase in your own language into some other language. You can use a bilingual dictionary to discover all of the necessary units whose combined presence should express an effective translation, but unless you know how to organize these units in the appropriate manner the dictionary information is not too useful.

A person wishing to translate the English phrase “He is hitting him” into Kiswahili might locate the following Kiswahili morphemes: “he”= a, “is...ing (present tense)”= na, “hit”= piga, and “him (third person object)”= m and thus try “a-na-piga-m.” This is close, but would not be easily understood, since the actual order in Kiswahili would be a-na-m-piga (he is him hitting).

The Complexity of Speaking

Our two ordinary adults will have to use all of these skills in order to satisfactorily conduct their conversation. **Phonology** (or the ability to make and arrange the appropriate speech sounds), **semantics** (the ability to comprehend and use the appropriate meanings), **pragmatics** (the ability to organize the interaction of speaking in an appropriate manner), and **grammar** (divided into morphology, the ability to construct words, and syntax, the ability to construct phrases and longer word sequences) are all necessary and each of these is an intricate system in its own right. Taken together they make speaking, even in this simplified overview, a wonderfully complex activity.

Yet the actual complexity of conversation is even greater than it appears. The systems which organize speaking (and other modes of conversation such as writing and signing)—taken together what we will call **language**—do not consist of a single neat collection of separate and unvarying rules. Language is best thought of as made up of multiple systems of more or less flexible guidelines which may overlap with each other, vary according to context and circumstance, and, especially, change over time.

The Study of Language and Humans

What is the interest of social science in language (studied primarily through the analysis of speaking)? Given that disciplines such as anthropology, sociology, history, and political science, among others, are the study of humanity, the answer is obvious; as a human activity,

language-directed activity must be included along with the activities associated with other social and cultural systems such as decision-making, ritual, clothing selection, tool use, classification of kinsmen. But to the field of anthropology in particular, language has more than just this general principle of inclusion to demand its study. Language is more than just one among many important human attributes; ***it is the single essential and definitional characteristic of humanity***. Without studying language, anthropology cannot claim to complete its primary mission, a holistic study of humanity.

Language and Human Evolution

When did language appear? Was it a gradual process, with language components accumulating over millennia, or did a basis for symbolic and grammatical communication appear relatively quickly, perhaps as a result of genetic change. This latter view is associated with the corresponding idea that language appeared along with the evolutionary arrival of *Homo sapiens*, within the last 1—200,000 years. This has stimulated considerable debate among linguistic anthropologists and it is a challenging issue due to the absence of any direct evidence for the presence of language in the distant past. Clearly, the presence of complex artifact manufacture that show the use of secondary implements (tools to make tools with its implied planning and conceptualization requirements) along with a set of complex artifacts would strongly indicate the presence of language. Consequently, most anthropologists would agree that by the appearance of cave decoration about 30,000 years ago language was also present. Failing the discovery of similar complexity in the artifact record at a much older age, it would seem that we are limited to only speculation about language presence earlier than this. In fact, the hundreds of thousands of years of the Early and Middle Paleolithic when tool types did not change significantly for earlier hominids such as *Homo erectus* would appear to support this idea, namely that language was not present until relatively recently. Still, it is difficult to avoid the conclusion that early hominids possessed some sort of system to manipulate concepts as part of their successful adaptive package. In addition to some sort of advanced imitative and experiential transmission of techniques to modify materials, in particular stone, the successful spread of *Homo erectus* over much of the Old World would suggest an effective use of social categories, i.e. a "cultural" tool kit. It is also difficult to imagine a cognitive system as complex as language arriving fully developed only with *Homo sapiens*, without earlier transitional systems.

Language and Primate Communication

Related to this question is the possibility of language-like communication among our closest animal relatives, the primates. Chimpanzees are arguably our closest relatives and if they can be shown to possess even a rudimentary language ability then this would argue for a very ancient presence of language. Unfortunately, research into the communicative capabilities of chimps, as well as gorillas and orangutans, has not been conclusive. It is clear that these other apes do not possess the vocal capabilities of humans. But the human ability to employ language in communication is not dependent upon sounds, as is easily demonstrated by the use of other modes of linguistically complex signaling used by humans such as signing, Braille, and writing. Researchers have been creative when working with non-human primates and, instead of employing vocalization, have used gestures (American Sign Language) or physical tokens (such as differently shaped and colored plastic pieces on a magnetic board, or something like a typewriter but with shapes instead of letters). There have been intriguing results, and some primates have acquired lexicons of two hundred "words" and apparently been able to string these together in what has been argued to be grammatical patterns. However, a human cannot have an *open* conversation with a chimp. Keep in mind that any human (one without a cognitive challenge such as aphasia or Down's Syndrome) can have a conversation with any other human once one or the other language is learned. And this conversation can be about almost anything—family life, morality, dreams, economic activities....

The significant features of human language are that it is an "**open**" and "**productive**" system. This means that humans, as a matter of completely ordinary conversational exchanges, can create brand new messages and that these can be understood and responded to, and this can be done on any topic, even imaginary ones. All that has been learned about the origins of human language from studying the abilities of our primate kin is that this kind of ability must have developed separately along the human evolutionary line. Language wasn't something that was carried along from our common primate ancestors. There probably was a communicational system among our primate ancestors that would allow some manipulation of limited content exchanges, but nothing more. But whatever this was, it stayed limited until at some point in human evolution a fully creative capability arose that permitted our kind of primate to produce essentially unlimited content exchanges.

Linguistics within Anthropology

One of the four major subdivisions of anthropology, therefore, is linguistics. It touches on many other areas that anthropology is interested in such as primatology, human paleontology, and the archaeology of ancient humanity. Language is such a seminal subject, having an effect on all human endeavors, that many other disciplines besides anthropology include it as part of their field of study. At a growing number of universities it exists as a separate discipline. This book reflects the author's anthropological background and training and thus presents linguistics from an anthropological perspective. Not, however, from the viewpoint of the specialized fields labeled as *anthropological linguistics* or *linguistic anthropology* (which deal in a variety of ways with the manifold and fascinating uses of language by humans or its conceptualizations by humans to a large variety of ideological ends), but as an introduction to the study of language structures hereafter just called linguistics. Simply stated, linguistics is the study of language[2]

Given the importance of a broadly comparative approach, one that applies to all humanity, linguistics gathers and studies data on as many languages as possible, used by any community for any communicative purpose, but especially the ordinary speech interactions among a community of speakers. While it is interested in systems of writing, it does not limit itself just to those languages associated with written traditions, nor just to those languages associated with economic and political power. And although there are many applications of linguistics, from designing writing systems to speech therapy, and while several of these applications are also of particular interest to other fields, such as historical reconstruction, speech therapy, and cross-cultural translation, linguistics itself is primarily interested in describing and explaining the operation of language in human communication rather than the applications of this knowledge, however practical they may be.

Subdivisions of Linguistics

Linguistics may be divided into a number of mutually dependent areas of study. These are examining the organizational systems of one language,

[2] The term "language" is often used very broadly to refer to any form of communication, e.g. computer language, bee language, dolphin language, the language of the flowers. While communication is present throughout the living world (indeed one definition of "living matter" is the ability to communicate), the term "language" should be reserved for one particular, very complex, form of communication—that which organizes human communication.

or what we will refer to as **descriptive linguistics**, trying to figure out how language systems change over long time periods and reconstruct language histories, or **historical linguistics**, figuring out the processes by which human acquire language, especially in the first several years of life, or **developmental linguistics**, and the manner in which human communities value and allocate their language behavior or **sociolinguistics**. Linguistics itself can also be viewed as being part of a general study of all animal communication, in particular the study of primate communication. But however fascinating it would be to compare animal communication systems, even just primate systems, we will not go into this topic beyond what was mentioned above. The position taken by the author is that human language-based communication is such a distinctively complex system that little is gained by comparing it to other systems in an introductory text. This topic has seized the imagination, and unfortunately the anthropomorphizing inclinations, of so many people that the communication of chimpanzees sometimes receives as much attention in introductory anthropology texts as does all of the diversity of human systems. Without denying the suitability of this type of comparative study, it will be a sufficiently challenging task here to present an overview of language.

Descriptive Linguistics

Descriptive linguistics is the description of the language systems in use for a particular community of speakers within a particular time frame (a generation or two). As you should appreciate by now, descriptive linguists face a challenge worthy of the most diligent, ingenious and resourceful investigators. In fact, there exists no complete description of any community's language, and the hundreds of partial descriptions are the work of many researchers, each contributing analyses on different aspects of a language system. The field of descriptive linguistics itself is further divided into such areas as phonology, grammar, semantics, and pragmatics. The comparative mission of linguistics would not be possible without the data provided by descriptive studies; those who use this material to draw conclusions about the state of human language can even be considered to be in another subfield—the study of language universals. One significant conclusion reached from this approach is that the approximately 1000 languages which have been studied in depth (of the 7000 or so languages in existence during the last several centuries) are all of equivalent complexity, that is to say that their organizations are equally complex and that each of these provides a complete basis for all of their respective community's communicational requirements.

There are a fairly wide range of descriptive approaches. Language, in what should become apparent over the course of this text, is an exceedingly complex phenomenon. As such, there are many different, but somewhat complementary, approaches to describing it. In the early part of the last century, there was much interest in system of sounds, but by the end of the century syntax and semantics had come to the foreground as the proper focus of linguistic study. Obviously, arguments over how best to describe languages veer over into theoretical arguments about what constitutes the general state of linguistic systems in the mind. We shall not consider these theoretical arguments here but hope that the reader will become interested enough to pursue these questions further.

Historical Linguistics

Historical linguistics studies the changes in language systems over time, as measured in generations. This is to differentiate it from developmental linguistics which studies the changes in language abilities through the human life cycle, particularly during childhood when language is substantially acquired.

Historical linguistics is not directly concerned with language change as it occurs. Rather, this branch of linguistics is interested in reconstructing the changes that must have occurred in the past and which now can be deduced by comparing selected contemporary languages. Using the data provided by descriptive linguistics, historical linguists look for evidence that two languages must have shared the same distant language "parent." Languages are such complex systems, that if two languages share common features (and if extensive borrowing by one from the other can be ruled out) then this is assumed to be the result of their having developed from the same language rather than the result of chance. One result of this investigation is to group languages into "families" and "stocks" according to common parentage. For example English and German are members of the Germanic language family while French and Spanish are members of the Romance (or Italic) family, and both, together with many other groupings such as Balto-Slavic (which includes Polish and Russian) and Indo-Iranian (which includes Persian, or Farsi, and Hindi) are part of the Indo-European language stock.

Historical linguists also try to place this classification into a time frame by determining when languages diverged. Some would be closely related "sister" languages which diverged fairly recently from the same "parent" form, and some would be distantly related "cousins", having "parent" forms which themselves diverged long before the others—in other words finding language "genealogies." In addition, by comparing vocabularies of related languages and thereby reconstituting the vocabularies of parental

languages, historical linguists attempt to determine aspects of the cultures and culture history of the speakers of the past languages. The reader should appreciate how fruitful this approach to language can be to other fields of anthropology, especially archaeology.

Developmental Linguistics

Developmental linguistics, on the other hand, examines language through the life cycle of individuals, in particular during childhood. One of the most remarkable aspects of language is its acquisition by children—who, within the first few years of life, as immature and cognitively unformed persons, and with little or no specific training, acquire this intricate set of cognitive systems for open and productive communication. Of course, as animals, we are specialized to learn language. Developmental linguists try to determine the exact nature of how language is acquired—the order in which different language systems are acquired, the role of the child's own creativity and the influence of different primary language user models, especially the differing effects of peers and adults and the differing effects of user models who speak different speech varieties, among many other topics.

Sociolinguistics

Finally, perhaps the most comprehensive of the sub-fields is sociolinguistics. Speaking itself is organized into types of **speech varieties** and these are interrelated with kinds of speakers and hearers, kinds of social situation and kinds of topics. Furthermore, different ways of speaking carry different evaluations, from honor to disgust. Language systems can be codified into written standards whose use can even be legislated and enforced. Communities can deliberately attempt to change the way they use speech varieties (especially when they are based on different languages) as part of developing their own symbolic image. Ways of speaking can atrophy and die out, or grow in importance from being merely a "dialect" to becoming the "Language" of a great empire. Sociolinguistics attempts to study all of these ways that speaking and language, as social institutions and objects of belief, are the focus of social activity. It deals with the dynamic existence of multiple ways of speaking within individuals (bilingualism) and societies (linguistic pluralism). More than any of the other sub-fields, sociolinguistics overlaps with other social science disciplines such as sociology, psychology and political science.

Terms to Know for Chapter One

phonetics
articulation
phonology
semantics
pragmatics
speech varieties
grammar
morphology
syntax
language
linguistics
openness and productivity
historical linguistics
developmental linguistics
sociolinguistics
descriptive linguistics

CHAPTER TWO

PHONETICS: THE DESCRIPTION OF SPEECH

The study of language must have a firm base in the accurate description of speech. This chapter will introduce articulatory phonetics as a method of describing speech based on the positioning and operation of the various organs in the vocal tract. Some of these organs are familiar, such as the tip of the tongue, some you may not have heard of, such as the uvula, and most you know of, but by a different name, such as the palate and velum which are the roof of the mouth. Following a brief discussion of the acoustic properties of speech, we will plunge into learning the many parts of the vocal tract and the ways in which they act to produce different kinds of speech sounds. We will then learn a system of phonetic notation which can serve as a convenient means of recording speech sounds according to their articulatory characteristics.

The Importance of Speech

Linguistics, as a social science, must have a means of accurately and reliably describing the phenomena it studies. The subject matter of linguistics is language, which involves a set of mental systems that organize speaking (and hearing). The state of cognitive investigation is not yet capable of describing all the particular language activities occurring as neurological processes within the brain. Linguistics, therefore, must do the next best thing and that is to carefully describe speech as the physical manifestations of language and then to assume that the patterns which can be determined in observable speech events actually reflect the mental processes of language. This is an important assumption and cannot be emphasized too strongly. The linguistic anthropologist, especially, is committed to an approach in which statements about language have to be based in valid descriptions of speech. This means that linguistics must include a reliable procedure for recording, transcribing, and analyzing speech sounds. This is called **phonetics**.

Acoustic Phonetics

Speech as Sound

Speaking is a physiological activity producing audible sounds. There are two ways of describing speech. Speech sounds can be described using their acoustic, or physical, characteristics or by using the way these are articulated in the vocal tract. The latter method is commonly used by linguists in the field. There are several reasons for this, but before defending an articulatory description let us briefly examine an acoustic description. Speech is sound and sound consists of vibrations in some medium; in the case of speech, this is typically air.

An acoustic description is consequently a precise account of the nature of these vibrations: how rapid they are ("frequency" expressed in complete vibrations—i.e. the air particles pushed to one side, springing back to the other side and then coming back to their original position—per second), how much energy they have (loudness, or the "amplitude"—i.e. size—of the vibrations, expressed in decibels), how long they last (time, expressed in seconds or, more usually, fractions of seconds), and how complex the vibrations are. This last feature refers to the fact that speech sounds rarely, if ever, consist of pure oscillations such as one might get by striking a tuning fork whereby the air is pushed smoothly back and forth in its vibrations. The vibration patterns in speech are a result of the airstream's many turns, constrictions, and bumps as it moves through the vocal tract. Furthermore, the several regions in the vocal tract act to enhance some vibrations and dampen others. As would be expected, by the time the airstream emerges it carries the effects of many vibrations. Acoustic descriptions break down the complex totality of a speech sound into its harmonic constituents and also specify the energy level of each of these. An instrument called a spectrograph (see Figure 2–1) produces a visual printout of segments of speech (about 4 seconds). This kind of information can also be represented (and stored) electronically using the mathematical properties of the vibration.

In the two examples in Figure 2–1, speech is represented by a large number of vertical bands. Each band is the result of a series of tiny light bulbs in a vertical line over which light sensitive paper is passed. Each bulb will respond according to speech sound energy in a certain frequency range, and the intensity of the light given off by the bulb is proportionate to the amount of energy in that frequency range. A darker part of the vertical band indicates greater energy at that frequency range, a lighter or white area indicates less energy or the absence of energy at that frequency range. Each type of sound has a distinctive pattern of dark bands over its brief time of duration. The two samples of speech upon which the

spectrograms are based are represented by normal spelling above each one, however the spacing has been adjusted so that the letters representing sounds are above the corresponding bands. (adapted from Denes and Pinson)

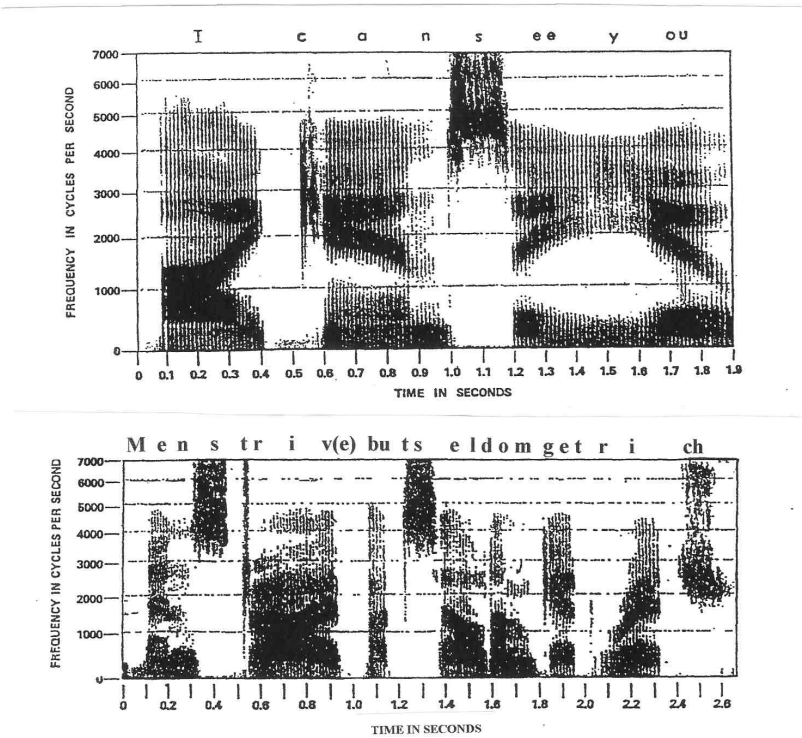

Figure 2–1 Spectrogram of Human Speech

This is what acoustic scientists use when they study the transmission possibilities for speech (e.g. radio, tape recording, telephone). Needless to say, these acoustic descriptions of speech, employing electronic sensing equipment and mathematical notation, appear to have the advantage of great precision and objectivity. It will be made much clearer below, but at this point you can assume that an articulatory description, using the positions, movement and shape of the various organs of the vocal tract, is not as precise as an acoustic description. So why do linguists use articulation as the basis for their descriptions of speech?

Laboratory Phonetics

A related development in the study of human speech is the use of sensing equipment that are capable of precisely measuring articulatory activity by the vocal tract organs. One example of this approach is the use of a device that is inserted in a speaker's mouth and covers the roof of the mouth (palate). This "pseudo-palate" has a large number of contact electrodes on its surface and can therefore precisely measure where the tongue is making contact with the palate. Other methods use x-rays to view the precise positioning of parts of the vocal tract. Laboratory phonetics shares with acoustic phonetics the device-assisted refinements that provide for precise descriptions of speech.

Advantages of Articulatory Phonetics

Precision in recording the vibrations of speech sounds and describing their exact placement in the vocal tract is valuable for a number of reasons, including acoustic analysis, speech synthesis, and diagnosing speech disabilities. But it takes special training to interpret these results and, therefore, does not lend itself to the learning and acquisition of speech sounds directly. For the human speaker, individual sounds are identified not so much by their absolute physical properties as by their relative differences from one another.

Besides, an articulatory description is more "human." Humans do not learn to speak by consciously manipulating frequency, harmonics, and energy, but by manipulating their vocal organs to produce speech sound differences. In other words, much as the acoustic characteristics of speech are important, the primary concern of speaking is the activity of articulation.

The application of acoustic phonetics was once constrained by its reliance on expensive equipment that was delicate and bulky. One virtually needed a roomful of machinery to conduct acoustic analyses just a few decades ago. Back then, field researchers would very much like an acoustic analysis to reveal the intricacies of some speech sounds from time to time so that they could better decide how to move on with their analyses. But until several years ago, this was a luxury that one could only dream of. Today, an acoustic analysis is very much at a field researcher's finger tips if he or she is equipped with a digital recorder or camcorder in addition to a laptop installed with acoustic software. Laboratory phonetics, by its very name, must be done in a laboratory setting using often bulky machinery.

For our purposes, acoustic and laboratory phonetics are best viewed as valuable ways to describe speech activity that are complements to, rather

than replacements for, articulatory phonetics. These descriptions are meant for a trained eye, in pursuit of technical questions involving speech production, not the introductory linguistics student. If acoustic and laboratory phonetics present views of speech sounds in scientific terms, articulatory phonetics presents an empirical approach to the description of speech sounds in behavioral terms.

Articulatory Phonetics

Articulation

An articulatory description consists of describing speech sounds according to the configurations and movements of the many parts of the vocal tract. Since it is tied to physiological landmarks (e.g. lips, tongue, nasal cavity) the speech of any human can be described using the same system since all humans have the same landmarks and potential configurations of their vocal tract. An important corollary of this fact is that it is possible for any human to speak any language—there are no special physiological requirements for any language. A descriptive system for articulation should be so designed that it is applicable to all human speech behaviors. If, for example, we were to omit the possible configuration of the root of the tongue against the back of the throat (the pharynx) simply because this configuration does not occur in English then this would severely limit the usefulness of our system. If we attempted to describe a language which has this configuration for some of its sounds (e.g. Arabic) our English-based system would not be sufficient and would have to be modified if it were to be useful. More importantly, the initial absence of this configuration in the phonetic system, if it were being applied to Arabic, might bias the linguist from accurately describing this kind of configuration, and many others not present in English, especially at the beginning of the study.

Manner of Articulation

Let us begin with the general ways in which a stream of air used in speech can be modified by the organs that make up the vocal tract. We will then examine the various places within the vocal tract where these modifications occur. Following this we will return to a more detailed discussion of manners of articulation. A note of caution is necessary here, however. We will only examine a “bare bones” version since the purpose of this book is only to present an introduction to the description of human articulation. The reader interested in pursuing phonetics further should start by carefully examining the International Phonetic Alphabet given in

Appendix C, and the bibliographic sources listed (particularly Abercrombie, and Samarin).

Speech is generated with an **airstream** coming into or out of the lungs. This airstream is forced out or sucked into the lungs by the operation of surrounding muscles. Modifications can be made in either direction of the airstream, outward from the lungs (pulmonic egressive) or inward to the lungs (pulmonic ingressive). Ingressive speech sounds are present in some languages (notably the Khoisan languages of southern Africa), but unless otherwise indicated we will only be describing egressive sounds since these are much more typical of human speech. We can examine modifications of the airstream by considering what is done to it in the vocal act. One type is a complete interruption of the air flow, another is simply a shaping of it. In between there are many different kinds of modifications.

A complete blockage of the airstream gives rise to a **stop**. In many cases it is the nature of the release as much as the blockage itself that characterizes the speech sound. This is why some linguists use the term plosive—as in "explosion"—since it emphasizes a sudden release of the airstream. Stops, then, are made by a closing and reopening of some part of the vocal tract. This can be done at a number of points in the vocal tract. The closure typically occurs in a single place but it may occur in more than one place (e.g. Yoruba spoken in West Africa has many words that have stop sounds with double closures).

Another manner of articulation produces a **fricative**. In this case, the airstream is not stopped, but squeezed through a narrowed opening in the vocal tract. This creates a considerable amount of turbulence, which is an important acoustic feature of these sounds. You might remember the term fricative by thinking of "friction". (These sounds have also been referred to as "spirants" and "sibilants" in some phonetic systems.) Fricatives can be made all along the vocal tract.

Another manner of articulation produces a **resonant**. For this sound the airstream is not squeezed but instead directed around some part of the vocal tract. This is done in three different ways. The tongue can be bunched up in the mouth with the airstream channeled over it, the front of the tongue can be raised up against the roof of the mouth and the airstream channeled around both sides, and the mouth can be closed off with the airstream directed through the nasal cavity. Stops, fricatives, and resonants, taken together as a group, are called **consonants**.

The last manner of articulation produces **vowels**. Here the airstream passes through the mouth and is shaped by varying positions of the tongue. These are also subject to the configuration of the lips and whether or not the airstream is also passing through the nasal cavity. Vowels will be described below.

At this point readers might like to try and use what they have learned and identify which kinds of consonantal manners are used in their own speech. Problem 1 in the exercises for this chapter (hereafter given by chapter and exercise number: 2–1) asks you to say your name and then list the manners of articulation for the consonants that occur (omitting, for now, vowels). Read the guidelines and pay attention to the examples provided from the author's own speech.

The Vocal Tract: Articulatory Landmarks

As can be seen from the above, there are many ways of modifying the airstream as it passes through the vocal tract. This section will deal with **places of articulation**, where these modifications occur. The vocal tract is not made up of separate segments, easily distinguishable from one another. What we shall do is to point out the areas and organs which are commonly used as landmarks in describing the articulation of speech sounds. Figure 2–1 shows a cross section through the vocal tract. The airstream exits the vocal tract at two openings: the lips and the nostrils. Unlike the nostrils, the upper and lower lips are active articulators and serve as landmarks. When one or both lips are used in articulation the adjective **labial** is applied to the sound. Behind the lips are the teeth, the next landmark. When "teeth" (usually the front teeth) are described in articulation with the adjectives **labiodental** and **dental** are used.

The roof of the mouth extends from just behind the upper front teeth to where the throat branches into the nasal and oral cavities. This region is divided into several places of articulation. From behind the teeth to about midway back, there is a bony backing to the roof of the mouth (shaded in Figure 2–1) and this is correspondingly called the "hard" palate. The very front of the hard palate—the gum ridge bulge just behind the front teeth—is the **alveolar ridge.** When this is involved in articulation the adjective **alveolar** is used. The rest of the hard palate is just called the **palate** and when it is involved in articulation the adjective **palatal** is used. Some articulation positions are slightly behind the alveolar ridge, and overlap with the front part of the palate. These are termed **alveo-palatal.** That part of the roof of the mouth without the bony backing is called the **velum**. At the very end of the roof of the mouth is the **uvula**. The adjectives used for these are, respectively, **velar** and **uvular**. The very back of the vocal tract, in the throat, contains the larynx at the top of which are the **vocal cords** or glottis. Stop and fricative articulations may be produced here and for these the term **glottal** is used.