LINGUISTIC ANALYSIS

LECTURE NOTES AND WORKBOOK FOR LIN180

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This is not a traditional introductory textbook for linguistics. Although many of the traditional topics are discussed in the following chapters, the book does not aim at a comprehensive summary of the discipline. Rather, the intent is to present to the student a unified theory of human language which demonstrates specifically that the structure of human language is not arbitrary and that it derives directly from genetically determined faculties of man. The essential nature of human language is not a matter of choice, convention, or whim. Cultural diversity among different societies and linguistic diversity among different languages and dialects reflect superficial variations on this basic, biologically determined structure.

The central theme of this text is quite simple: human language reflects the capacities and limitations of human beings. There are three facts supporting this theme. First, all normal human beings, regardless of the languages they speak and the cultures they represent, have the same basic biological makeup. Second, all children learn whatever language they are exposed to in whatever cultural setting; children are not predestined to learn specific languages. Third, language acquisition in all children proceeds in a uniform and predictable fashion despite widely varying environmental conditions.

These facts clearly indicate that the structure of all languages must be based on the nature of man. This is not an original idea; indeed, much of the current work in linguistics in all theoretical frameworks proceeds from this position. For example, it is basic to Chomsky’s concept of linguistic universals.

Where this text differs from most introductory texts is in the manner in which the various subdivisions within linguistics are described. At every point possible, the development of our theme will be bolstered by specific arguments that have reference to human biology and psychology. All components of language will be related to each other, rather than presented as discrete units, so that elements of linguistic structure, change, and variation are integrated. Our discussion of different languages and different cultures will show how linguistic divergence is constrained by linguistic universals.

Generally, linguistics departments on university campuses are grouped with the social sciences (psychology, sociology, anthropology, etc.) or humanities (philosophy, music, art, literature, etc.). In either of these contexts, linguistics is in a distinctive position to make contributions to the history of ideas. Linguistic argumentation, that is, the justification of grammars, is a highly developed methodology that can be used to make predictions about the nature of man and mind. Traditional justification of theoretical models in the natural and physical sciences derives from experimentation. The techniques of justification in biology and physics are familiar to every student. In linguistics also, it is possible to formulate hypotheses of considerable rigor and subject them to scientific scrutiny that leads directly to their verification or refutation. This book aims to show the introductory student how this is possible.
More than anything else, this text is designed to disabuse readers of the many misconceptions that surround the study of language. These fallacies include, among other things, the idea that different dialects, different cultural patterns, and even different languages reflect different levels of human competence, as well as the prevalent idea that grammatical structure is haphazard and unjustifiable. Although it may be difficult for the novice to believe at this point, the study of grammar can lead to provocative and interesting ideas about the nature of man and the origin of cultural diversity.

Needless to say, one cannot attain such a high level of generality about language, or anything else, without attention to detail. Therefore, in the following chapters, students will be introduced to some of the technical vocabulary of linguistics. The aim is not to memorize facts per se, although mastery of some details is essential before application can begin; rather, it is to show how rigorous investigation can lead to meaningful generalizations. Lists of memorized facts rarely stay in people's minds for very long, but genuine comprehension of issues does. Moreover, such comprehension can have a significant impact on one's life. In this regard, this text aims to satisfy some of the major objectives of general education, which include, among other things, helping students understand and master basic techniques for the analysis and synthesis of ideas. Such techniques involve the ability to gather, organize, and interpret data, to separate what is significant and interesting from what is irrelevant and trivial, and to formulate hypotheses of real explanatory power. Effective thinking occurs when one is able to uncover the essential nature of any given problem and to propose reasonable solutions consistent with available resources.
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CHAPTER ONE: FUNDAMENTALS OF LINGUISTICS

1.1 GRAMMATICAL CHARACTERIZATION AND GRAMMATICAL REALIZATION

People who learn a language from earliest childhood are considered **NATIVE SPEAKERS** of that language. Knowledge of one’s **NATIVE LANGUAGE** is quite special and different in many ways from the knowledge one gains studying a language in school, for example, in French class. In particular, native speakers are not generally aware of what they know about their native language and usually cannot describe what they know or explain how they know it. Their knowledge is unconscious. To see this, consider the following sentences, which differ only in that (1b) contains the word *that*:

(1)  
   a.  Do you think the judge will tell the truth?  
   b.  Do you think *that* the judge will tell the truth?

Every native speaker of English knows that these two sentences are yes/no questions, that is, questions that can get either a positive or negative answer. Now suppose that a person does not know who will tell the truth and wants to find out. In such a case, the person could ask a WH–question, which is a question that begins with a WH–word like *who, what, where,* etc. Given sentences like those in (1), every native speaker unconsciously knows that the results of attempting to ask such a WH–question will be different. While (2a) is a perfectly grammatical WH–question related to (1a), (2b), containing the word *that,* is **UNGRAMMATICAL** (an asterisk at the beginning of a sentence indicates that it is ungrammatical, which means that it violates some rule).

(2)  
   a.  Who do you think will tell the truth?  
   b.  *Who do you think *that* will tell the truth?  

There is a specific principle that rules out sentences like (2b), yet native speakers typically are not consciously aware of what that principle is. Nor can they explain why the word *that* can be left out of (3a) to produce the synonymous (3b), whereas a similar deletion in (4a) produces the ungrammatical (4b).

(3)  
   a.  The lawyers *that* the judges admire will tell the truth.  
   b.  The lawyers the judges admire will tell the truth.  

(4)  
   a.  The lawyers *that* admire the judges will tell the truth.  
   b.  *The lawyers admire the judges will tell the truth.  

Again, there is a specific principle that accounts for the ungrammaticality of (4b) which native speakers must know, at least unconsciously, because they all recognize that (4b) is not a well-formed sentence. About the best that the average native speaker can say about (4b) is that it doesn’t sound right. The same is true of (2b) and, in fact, all ungrammatical sentences. In general, native speakers cannot explain why grammatical sentences are grammatical and why ungrammatical sentences are ungrammatical. Yet they do know the difference between the two.
The principle that predicts the ungrammaticality of (4b) is highly specific: changing *admire* to *know* in (3) produces the pair of sentences in (5) which mean the same thing, while changing *admire* to *know* in (4) produces the pair of sentences in (6) which mean very different things.

(5)   a. The lawyers that the judges know will tell the truth.  
      (= The ones who will tell the truth are the lawyers that the judges know.)
   b. The lawyers the judges know will tell the truth.  (=5a)

(6)   a. The lawyers that know the judges will tell the truth.  
      (= The ones who will tell the truth are the lawyers that know the judges.)
   b. The lawyers know the judges will tell the truth.  (=6a)

Notice also that (6b) looks just like (4b); however, (6b) is grammatical, but (4b) is not. Furthermore, (5a) and (6a) can be expanded as in (7), but a similar expansion of (4a) produces (8) which is not grammatical.

(7)   a. The lawyers that the judges know will tell the truth are from Michigan.
   b. The lawyers that know the judges will tell the truth are from Michigan.

(8)    *The lawyers that admire the judges will tell the truth are from Michigan.

These examples are not gimmicky or atypical; thousands of pairs of grammatical/ungrammatical sentences like them can be found in the linguistics literature. Such abundant examples emphasize that native speakers unconsciously know a vast and detailed array of facts about their language, and that these facts are largely hidden from introspection and analysis. It is simply incorrect to say that the facts of language – the grammar – are well known to (even educated) speakers. This means, of course, that there is a difference between having knowledge of a language and being able to talk about that knowledge. Linguists refer to the unconscious knowledge that native speakers have of their native language as their **LINGUISTIC COMPETENCE**.

Since native speakers do not consciously know what makes a sentence grammatical or ungrammatical in their native language, it follows that native speakers do not teach language to their children. While parents do correct children on occasion, it is hardly likely that all native speakers of English have been told by their parents that sentences like (2b), (4b), and (8) are ungrammatical and should never be uttered. If speakers required specific instruction of this type, no one would acquire a native language because there is an infinite number of grammatical and ungrammatical sentences in every human language. In addition, even when native speakers have expert, fluent knowledge of grammatical principles, they can’t share this knowledge with their children because children are unable to comprehend even the most elementary statements about grammar. Most of one’s native language is acquired *before* one possesses the cognitive skills to discuss the grammatical principles which underlie the ability. For example, kindergartners clearly know the difference between statements and questions before their first day of school, yet none can discuss the difference in principled terms that reveal the facts behind the difference.
In view of the above, modern linguistics is principally concerned with two broad empirical problems which have often been referred to as the **GRAMMATICAL CHARACTERIZATION PROBLEM** and the **GRAMMATICAL REALIZATION PROBLEM**. Grammatical characterization entails describing the **LINGUISTIC COMPETENCE** of native speakers, that is, discovering and generalizing the grammatical principles that constitute their unconscious knowledge of their native language. In grammatical characterization, a linguist describes *what* the principles are which determine the grammaticality of examples like (1) through (8).

Grammatical realization, on the other hand, entails accounting for native speakers’ **LINGUISTIC PERFORMANCE**, that is, their acquisition and use of their unconscious knowledge. In grammatical realization, a linguist describes *how* such principles become part of the linguistic competence of native speakers, in short, *how* children achieve mastery of their native language.

### 1.2 THE STUDY OF GRAMMAR

In the preceding discussion, the word **GRAMMAR** was used in several distinct, yet interrelated senses. This is typical because the term has a variety of applications. Fundamentally and most commonly, it is used to mean a description of a language, that is, an explicit characterization of the structure of the sentences in a particular language. A grammatical characterization of English, for instance, isolates and categorizes the basic linguistic elements found in English sentences, indicates how these elements are related to each other, and specifies the manner in which they are arranged in larger units. Terms like *noun* and *verb* are examples of labels which grammarians have given to some of these elements, and a statement like *the subject of an English sentence precedes the predicate* is an example of the kind of rule usually found in a grammar of English.

In a second, more technical, sense, the word *grammar* is used to mean a theory of language, that is, a system of hypotheses formulated to account for the various features of human language in general. For example, one of the outstanding features of all human languages is the fact that each one consists of a potentially infinite number of sentences. In effect, every human language allows for **CREATIVITY**. Although there are severe constraints on individual structures when they are combined to form complex sentences, every human language is **RECURSIVE**. This means that there are structures that can repeat themselves indefinitely. Thus, it is impossible to make a list of all of the sentences in the English language; additions to any such list can always be made by combining the sentences one has already thought of with words like *and*, *but*, *or*, etc. There is no longest English sentence. For example, (9) could, theoretically, be continued without end.

(9) **This is the cat that caught the rat that ate the mouse that lived in the house that Jack was in when he told Harry that Bill said that Mary wanted to know if Sue would be able to tell her father that Jane hates fairy-tales because they make her think of an unfortunate experience which occurred one day when she was visiting her aunt in Idaho and...**

These two uses of the word *grammar*, i.e., grammar as characterization of a particular language (e.g., English grammar) and grammar as a theory of human language generally (**UNIVERSAL**
GRAMMAR), are basic to all of the other more specialized or expanded uses of the word. In most schools of modern linguistics, for example, grammar, as a description of a language, includes the study of sounds and the way sounds are related to meaning. This usage is merely an expansion of the more common one in which a grammar only describes the classification and arrangement of the forms of a language, the syntax. Moreover, it is important to realize that, although there is a distinction between grammar as description and grammar as theory, nevertheless, each of these basic uses implies the other. On the one hand, a grammatical description is always written within the framework of some grammatical theory, however loosely formulated, and, on the other hand, grammatical theories are proposed so that correct grammatical descriptions can be written.

In addition to this, linguists make a distinction between DESCRIPTIVE GRAMMAR and PRESCRIPTIVE GRAMMAR. In descriptive grammar, no value judgments are attached to the characterization, that is, the grammar characterizes whatever speakers say. In prescriptive grammar, on the other hand, value judgments are attached to the characterization, so that prescriptive grammars prescribe what one should say and why, for example, that one should say *It’s I* and not *It’s me*, if one wishes to sound educated. Throughout the following discussion, we will be concerned with only descriptive grammar; therefore, our description must provide for utterances like *It’s me* as well as utterances like *It’s I*.

1.3 SPEECH AND WRITING

One of the most common misconceptions about language is the belief that writing is somehow more important than speech. It is not difficult to imagine how this misconception arose: writing has always been considered a sign of intelligence and of civilization; it is generally more permanent and durable than speech; and, through it, the artistic and scientific achievements of humankind have been recorded and preserved. Although there may be some justification for this cultural superiority of writing over speech, nevertheless, it is speech and not writing which is basic both to language itself, as a means of communication, and to linguistics. There are several reasons for this.

First, writing is a relatively recent invention. Even the most ancient examples of writing that have been preserved are only about seven thousand years old. On the other hand, it seems safe to say that humans have been speaking since the evolution of human society many hundreds of thousands of years ago.

Second, writing is much less widespread than speech. Many languages, even today, exist only in spoken form. Furthermore, there are many extinct languages about which very little is known, except that they were spoken in a particular area at a particular time, because these languages were not written down.

Third, it is speech and not writing which human beings are predisposed to learn. The acquisition of speech in children proceeds automatically and without conscious attention or specific instruction, unlike the acquisition of writing skills. Acquiring writing ability, on the other hand, is a voluntary, deliberate choice.
Fourth, and most important, writing is a reflection of speech. All alphabetic writing systems such as English are based, in one way or another, on the sound systems they represent, that is, a particular sign or letter always represents some unit of sound or sounds in the spoken language. It is never the case that the sound system of a language is based on a particular system of writing.

For all of these reasons, writing has only a marginal importance in most language studies. Linguists are primarily concerned with describing speech and ascertaining how it is acquired and used.

1.4 LINGUISTIC ARGUMENTATION

Linguistic competence is clearly related to linguistic performance. The facts of grammar are not arbitrary but, in large part, are due to facts regarding the nature of human beings including their cognitive abilities and cognitive limitations. Human beings are able to acquire human languages because they are genetically constituted to do so. It is simply inconceivable that all native speakers arrive at the same internal understanding of their language on the basis of trial and error, given that the native acquisition of any language proceeds rapidly and uniformly and without instruction. In very specific ways, human languages reflect human abilities. For example, the rules of every human language are based on LINGUISTIC STRUCTURE, that is, on linguistic units. Consider the following sentences.

(10)  a. Eventually the president will resign.  
    b. The president eventually will resign.  
    c. The president will eventually resign.  
    d. The president will resign eventually.  
    e. *The eventually president will resign.

The possible positions that the sentence adverb eventually can occupy are not unpredictable. This is because every English sentence consists of structural units. Using traditional terminology, these units might be labeled and diagramed as follows:

(11)  

One can see from this diagram, that the sentence adverb eventually can occur among any of the units of the node SENTENCE. There are three such units attached directly to the node SENTENCE: SUBJECT, AUXILIARY, and PREDICATE. Accordingly, there are four possible positions for the sentence adverb in (10). Further, sentence (10e) is excluded from the infinite list of grammatical sentences in English because it violates a structural principle of English, and not for some arbitrary
reason. In short, children do not have to be told that (10e) is ungrammatical: its status is predictable on the basis of other structural facts about English that they unconsciously know.

Of course, the important question here is how to determine the structural units in the first place, that is, how to justify a diagram like (11). Such a diagram characterizes English in two ways. First, it states that English sentences consist of three structural units; second, it states that those units should have three different labels. Each of these statements must be justified before they can be accepted as an accurate characterization of English.

At this point, let us consider only the question of the number of units, putting aside the matter of labels until the chapter on syntax. Linguists determine structural units such as the units of a sentence by attempting to manipulate the words in that sentence in one of three ways: **REFERENCE**, **OMISSION**, and **PLACEMENT**. Great caution is needed during such investigations because, as we have seen, the facts of language are largely hidden. It is easy to be misled. Sometimes various manipulations produce conflicting results. This merely means that the matter is more hidden than first imagined and that other supporting data, perhaps even from other languages, must be looked at. For this reason, the more arguments that can be marshaled to support a particular characterization, the more justified it is.

Introductory linguistics students make a number of incorrect assumptions when they attempt to show that a characterization is justified. First, they assume that the analysis should be obvious or, at least, readily clear after a little thought. Second, they assume that there are unique, formulaic, infallible, and unambiguous procedures available for them to apply to the problem. Third, they assume that they do not know what the correct analysis is. All of these assumptions are wrong. The facts of language are not at all clear, and there are no procedures available by which one can quickly discover the best characterization of the data. If this were correct, the job of linguistics would have been completed long ago. In truth, grammatical characterization is only in its infancy. Also, all native speakers, because they are native speakers, know which sentences, out of an infinite list of sentences, are grammatical and which are ungrammatical. Native speaker competence demands such knowledge. Therefore, the problem is to learn how to access the unconscious knowledge one has by asking the appropriate questions. In regard to (11), consider the following data:

(12) **Reference:** the elements of sentences can be substituted as units.
    a. Who will resign? *(Who replaces the president in a question.)*
    b. The president will announce that he will resign. *(He replaces the president in reference.)*

(13) **Omission:** the elements of sentences are omitted as units.
    a. The president will resign if the first lady asks him to ________.
    b. The president will resign, and the first lady will ________ too.

(14) **Placement:** other elements cannot break up units.
a. Eventually the president will resign.
b. The president eventually will resign.
c. The president will eventually resign.
d. The president will resign eventually.
e. *The eventually president will resign.

Notice that the three manipulations in (12) through (14) have varying results: sometimes grammatical sentences are produced; other times, ungrammatical ones. In each case, NATIVE SPEAKER INTUITION can verify the decisions on grammaticality. This does not mean that native speakers always agree on issues of grammaticality, nor is total agreement crucial. What is crucial is that, for most of the manipulations, most of the results are agreed upon by most of the speakers. This makes communication between people possible. Their internalized grammars of English are substantially the same.

Now observe that the best characterization of the units in (12) through (14) is, in fact, (11); that is, the three unit structure diagramed in (11) predicts (12) through (14). There is no manipulation which, for example, demands that president will be analyzed as a unit. Therefore, most linguists today argue that English sentences have three basic units whatever they choose to call them. As a foundation for argumentation, linguists use the manipulations of reference, omission, and placement. This helps to distinguish sentences which superficially seem identical, but which are, in fact, very different, like the following (A=ambiguous; U=unambiguous):

(15) a. He looked up the street. (A) He looked the street up. (U)
b. He looked up the address. (U) He looked the address up. (U)
c. He looked up her dress. (U) *He looked her dress up.
d. He cleaned up her dress. (U) He cleaned her dress up. (U)

Notice that manipulation of these sentences produces different results, indicating that their structure is not the same.

1.5 UNIVERSAL GRAMMAR (UG)

Turning to the issue of grammatical realization, an immediate question is, Why are the rules of all human languages based on linguistic units as opposed to something else? For example, rather than permuting a sentence adverb like eventually among structural units to produce paraphrases like (10a) – (10d), why don’t human languages permute units on the basis of some other criterion like counting? As it happens, there is no rule in any human language that is based on counting per se, e.g., there is no rule like (17) based on principle (16).

(16) The rules of human language are based on counting.

(17) Place sentence adverbs optionally after every two words.
Rule (17) might predict that *eventually* could occur in every position marked with a # in (18).

(18) The president # said that # he would # resign as # soon as # he found # the stationery # to write # with.

The obvious reason that human languages do not contain rules based on principle (16) is that human beings cannot count and speak at the same time. Try, for example, to reread the present sentence at normal speed and count the number of words as you reread it. What is the ninth word?

Sometimes languages have rules that position elements initially or finally in sentences. For example, in a direct question in English, the auxiliary unit (helping verb) comes first as in *Will he do it?* Languages even contain rules that position elements in a specific order after an introductory structural unit. For example, German has a rule that says the verb must be the second structural element when a sentence begins with a unit other than the subject. But such rules as these are highly constrained. It is never the case that a language contains a rule for positioning a unit after, say, six other units. The reason is rooted in human memory constraints. The rules of human language are based on structural units because human short term memory (STM) is severely constrained.

It is a well known fact that humans can only remember about five to seven bits of information immediately presented to them; for example, no more than the amount in a local telephone number. In early childhood, the amount is much less than in adulthood. Gradually, during early development, as children’s cognitive capacities mature, their ability to operate within STM constraints increases. But there is an upper limit for all humans. If the information is organized into units or *chunks*, then more can be remembered. Read each of the following strings of words at normal speed and then try to recall them from memory.

(19) a. criteria performance high establish may institutions some
    b. some institutions may establish high performance criteria

(19b) is much easier to remember than (19a), and the reason is clearly that (19a) has no structure; it is simply a list of words. (19b), on the other hand, contains units which *chunk* or organize the words. We can diagram (19b) as follows:

(20)

As a result of many considerations like these, linguists have concluded that the difference between grammatical and ungrammatical sentences in human languages is not generally arbitrary. The
ungrammaticality of sentences like (10e) (*The eventually president will resign) is due to the fact that they violate some principle such as (21).

(21) The rules of human language are structure dependent.

Principle (21) is directly related to the nature of human short term memory (STM): if languages did not have structure dependent rules which organized words into units, sentence length would have to be very short. Therefore, it follows that the nature of language is directly related to the nature of human beings, in particular, to human mental abilities and limitations. Notice that there is no a priori reason why humans should have evolved the capacity (21) rather than (16). Computers can, in fact, deal with rules based on principles like (16) and routinely do so. If extra-terrestrial beings were to land on earth speaking languages that contained principle (16), it is clear that humans would not be able to understand them without paper and pencil analysis.

Modern linguistic theory has uncovered many principles like (21) which help to define the nature of language and, therefore, the nature of human beings. In linguistics, a principle like (21) is called a **LINGUISTIC UNIVERSAL**, and the entire set of such linguistic universals is called **CORE GRAMMAR** or **UNIVERSAL GRAMMAR (UG)**. UG defines what can and cannot form part of a human language; therefore, it forms part of a human’s genetic endowment. That means that children do not have to learn principles like (21); they are born with tacit knowledge of the fact that the rules in the language to which they have been accidentally exposed are based on (21) and not on (16). The reason is clear: human beings must operate within their capacities and limitations. They cannot spend the afternoon underwater, for example, without some artificial device. They cannot outrun cougars. They cannot understand languages that contain rules based on counting. It does not take much experience, if any, for children to learn that they have these limitations. They are part of the biological makeup of all humans.

UG contains two types of universals: **FORMAL UNIVERSALS** and **SUBSTANTIVE UNIVERSALS**. A formal universal is a stipulation on the organization of grammar and on the form and functioning of grammatical rules. (21) is an example of a formal linguistic universal. It stipulates how the rules of natural language must work, in particular, they must be based on structure.

The second type of linguistic universals, substantive universals, are stipulations on the elements or features which can occur in natural language. For example, the sounds of language are distinguished by a number of features like the following:

(22)  a.  [m]  [+CONSONANT, +BILABIAL, +VOICED, +NASAL]  
    b.  [b]  [+CONSONANT, +BILABIAL, +VOICED, –NASAL]  
    c.  [p]  [+CONSONANT, +BILABIAL, –VOICED, –NASAL]

The letter m signifies the sound [m], which is really an abbreviation for a number of phonological features. Specifically, [m] is a consonant which means that it is formed by temporarily obstructing the air as it leaves the vocal apparatus. Further, the obstruction is made by the two lips
([+BILABIAL]) while the vocal cords are vibrating ([+VOICED]). Lastly, the air exits through the
nose in articulating [m], that is, it is a nasal sound ([+NASAL]). Changing any of these features
changes [m] to some other sound. For example, if the air exits through the mouth rather than the
nose, then [b] is produced. If the air exits orally without the vocal cords vibrating, then [p] is
produced. The features given in (22), therefore, define the phonological structure of some English
consonant sounds. The number and types of these features is not arbitrary. For example, all sounds
are either [+NASAL] or [–NASAL]; the air exits through the nose or the mouth.

Air could potentially escape the human head from the lungs via three routes: the mouth, the nose,
and the ears. In fact, when the tympanic membrane (eardrum) is not intact, people can blow smoke
through all these orifices. Despite this, no human language contains a phonological feature
opposition [+AURAL]/[–AURAL] meaning involving the ears/not involving the ears. The reason
for this is transparent: humans cannot use their ears for the production of sounds. There is no a
priori reason why the ear should have evolved in the way it did; conceivably, evolution could have
produced an aural canal with an unimpeded connection to the outside. This would have made it
possible to expel air through the ears normally; however, that did not occur. On the other hand, a
separation of the nasal and oral passages did occur in the evolution of mammals. From the point of
view of UG, human languages utilized this separation globally, so that most natural languages
contain a phonological feature opposition [+NASAL]/[–NASAL]. This feature opposition is
possible because humans have a velum which can be lowered to close off some of the oral passage
and allow nasal modification of the air stream. Thus, we have a clear example of how natural
languages are constrained by human anatomy.

Like formal universals, substantive universals are part of the genetic endowment. They form part
of the tacit linguistic competence that all humans innately possess, quite simply because they are the
direct reflection of man’s capacities and limitations. Children don’t have to learn that the sounds
of their native language won’t require modification through their ears, just as they don’t have to
learn that the rules of their native language are not based on counting. They are born with the
intuitive knowledge that [+AURAL] and [–AURAL] are not possible phonological features of
human languages, just as they are born with intuitive knowledge of principle (21). Further, since
all normal children can breathe either through their nose or their mouth, children intuitively know
that their native language might contain the features [+NASAL] and [–NASAL].

Notice however that every language does not have to contain the same set of universals. Not every
language has the same rules and the same features. For example, English does not use the feature
opposition [+NASAL] to distinguish its vowels, but French does. UG simply defines the limits of
what can be part of a human language because of the capacities and limitations of the human
language apparatus (the brain and the organs of speech and hearing). Therefore, a native speaker’s
tacit linguistic competence consists of two kinds of knowledge: (i) innate knowledge or UG, which
is part of a human being’s genetic endowment and consists of the kinds of rules and features which
any language might contain; and (ii) acquired knowledge, which consists of the particular rules and
features that occur in the native language(s) to which the speaker has been exposed as a child.
In the specification of UG, the close association between grammatical characterization and grammatical realization becomes clear. Formal and substantive universals, which appear as the rules and features in the grammars of human languages, are grounded in the linguistic capacities of humans. Therefore, the discovery of a universal in the course of grammatical characterization can often lead to a hypothesis about the way humans process information. An example of this is the postulated formal universal (23a) which, it might be argued, leads to the perceptual strategy (23b).

(23) a. The clause is the major structural unit in human language; that is, the maximal specification of the syntactic rules of language is the clause.

b. The clause is the major perceptual unit in human language; that is, if a string of words can be interpreted as a clause, then it must be interpreted as one.

(23a) claims that the major syntactic unit found in the characterization of human languages is the **CLAUSE**, which is a string of words that typically contains one subject and one tensed (present, past, future) verb. (23b) claims that ordinary language use centers around clause structures, so that a string of words that could possibly be a clause is probably a clause. Properly, (23a) is part of grammatical characterization, the result of attempting to characterize the structure of English and various other languages; (23b) is part of grammatical realization. We can see the operation of (23) in the following data.

(24) a. The coach thought that John succeeded.

b. The coach thought John succeeded.

c. That John succeeded pleased the coach.

d. *John succeeded pleased the coach.

Notice that the word *that* can be left out of (24a) to produce (24b). We saw the same operation in (3). However, if *that* is left out of (24c), the ungrammatical (24d) results (cf. (4)).

Faced with data like (24), a linguist can assume that the ungrammaticality of (24d) is either arbitrary or principled. We have argued above that languages would be unlearnable under the conditions which attend ordinary acquisition if the distinction between grammatical and ungrammatical sentences were always arbitrary. Recall that linguistic knowledge is unconscious; accordingly, children are not taught language by their parents. They must discover the grammar of their native language without the benefit of instruction. Furthermore, since children can learn ANY human language and do so effortlessly and rapidly, the facts of language acquisition demand that linguists assume that some process other than trial and error guides children. Data like (24) lead linguists to assume that (24d) is ruled out by some principle of UG, not by some arbitrary language convention. Data like (24) from many different languages suggest that the principle entails something like (23).

Students new to linguistic analysis typically believe that a sentence like (24d) is ruled out because it doesn’t make any sense, that is, it doesn’t mean anything. But this is incorrect as the grammaticality of (24c) clearly shows (cf. *John’s success pleased the coach*). What is wrong with (24d) is not that its meaning is somehow bizarre; rather, it is syntactically ill-formed.
Observe that, in (24d), *John succeeded* is a clause; it has a subject (*John*) and a tensed verb (*succeeded*). Principle (23b) demands that it be interpreted as a clause. Since *John succeeded* already has a tensed verb, the clausal unit is fulfilled and *pleased the coach*, which contains another tensed verb (*pleased*), cannot be part of the same clause. The function of *that* in (24c) is, in fact, to separate the two clauses. Consider the following:

(25)   a. [Something] pleased the coach.
       c. [John] succeeded and pleased the coach.

The bracketed elements in (25) are subjects. In (25a), the sentence consists of one simple clause with one subject (*something*) and one tensed verb (*pleased*). In (25b), on the other hand, the sentence consists of two clauses, where the subject of the main clause is itself another clause, *John succeeded*. The function of *that* in (25b) is to subordinate one clause to the other, to separate them. In (25c), the word *and* performs a similar function of separating two clauses, only in this case it coordinates the two tensed verbs (*succeeded* and *pleased*), rather than subordinating one to the other.

(24d) eliminates the *that*, so the two clauses are no longer separated; accordingly, the sentence is ungrammatical. It contains two tensed verbs that are not separated by either a subordinator like *that* (cf. (25b)) or a coordinator like *and* (cf. (25c)). More importantly, its ungrammaticality is not arbitrary: it is predictable from (23). Therefore, children do not have to learn not to say (24d), any more than they have to learn not to try to look through solid objects. They are born with intuitive knowledge of the principles in (23), which evidently derive from some as yet unknown fact(s) about human brain function. These principles predict that all sentences like (24d), in any human language, will be ungrammatical. This includes (24d), as well as (26d) and any others which violate (23).

(26)   a. The player who(m) the coach picked won.
       b. The player the coach picked won.
       c. The player who won did a backflip.
       d. *The player won did a backflip.
       e. The player won and did a backflip.

Despite these remarks, it is always possible that a language might allow some particular construction under highly specified conditions even when there is a general constraint against it. After all, it is a well–known fact that languages do have exceptions. In such cases, it is useful to distinguish what is expected in language on the basis of universal principles from what is unexpected.

Linguists call rules and structures that are expected **UNMARKED**, and those that are unexpected, because they violate general principles, **MARKED**. The more tightly constrained a principle is by the nature of human beings, the less likely it is to have exceptions and the more highly marked such exceptions become. For example, if the equivalent of (26d) were found to be grammatical in some language, it would be highly marked. As one would expect, marked constructions take children much longer to acquire than unmarked ones.
1.6 LEVELS OF ADEQUACY

There are several levels of adequacy that a linguist can attain in grammatical characterization. The first level, called OBSERVATIONAL ADEQUACY, is attained when the facts are noted. The second level, called DEScriptive ADEQUACY, is attained when the facts are described with generalized principles or rules. The third, highest level, called EXPLANATORY ADEQUACY, is attained when those principles are related to the nature of the language apparatus of humans. As a linguist moves from observational to explanatory adequacy, an ever higher level of generality is reached. At the highest level, linguists begin to relate individual languages like English to UG and, therefore, to offer a real explanation for linguistic phenomena. In attempting to attain explanatory adequacy, a linguist is also able to separate out what is arbitrary and language specific, from what is predictable in terms of UG. As a result, attaining explanatory adequacy in grammatical characterization helps to solve the grammatical realization problem. Our discussion of the data in (24) in the previous section was an illustration of this. As a further example, this time from phonology, consider the following data.

In many languages, there are four major points of articulation for distinguishing consonant sounds. Looking again at nasal sounds, we find the following:

(27) a. [m] articulated at the extreme front of the mouth
    b. [n] articulated against the alveolar ridge behind the upper teeth
    c. [ñ] articulated against the palate or roof of the mouth
    d. [õ] articulated at the extreme back of the mouth

The four nasals occur in the following words:

(28) a. [m] whim, met, simmer
    b. [n] win, net, sinner
    c. [ñ] Spanish words like mañana (‘tomorrow’)
    d. [õ] wing, singer

Many phonological characterizations of these sounds classify the four nasals as follows:

(29) a. [m] is bilabial [+BILABIAL]; produced with the two lips
    b. [n] is alveolar [+ALVEOLAR]; produced by raising the tip of the tongue to the alveolar ridge, i.e., the ridge behind the teeth
    c. [ñ] is palatal [+PALATAL]; produced by raising the front part of the tongue to a point on the hard palate just behind the alveolar ridge
    d. [õ] is velar [+VELAR]; produced by raising the back of the tongue toward the soft palate or velum

Notice that this characterization requires four phonological features and a considerable amount of unnecessary redundancy. For example, in addition to saying that [n] is [+ALVEOLAR], one can
say it is [–BILABIAL], [–PALATAL], and [–VELAR]. To correct this, we can reduce the number of oppositions from four to two by reducing the number of features from four to two as follows:

\[(30) \quad \begin{align*}
\text{a. } & [+\text{ANTERIOR}] \text{ articulated in the front of the mouth (at or in front of the alveolar ridge)} \\
\text{b. } & [-\text{ANTERIOR}] \text{ not articulated in the front of the mouth (behind the alveolar ridge)} \\
\text{c. } & [+\text{CORONAL}] \text{ articulated with the blade of the tongue (the portion immediately behind the tip) raised from its neutral position} \\
\text{d. } & [-\text{CORONAL}] \text{ not articulated with the blade of the tongue (the portion immediately behind the tip) raised from its neutral position}
\end{align*}\]

With these features, we describe nasals much more efficiently as follows:

\[(31) \quad \begin{align*}
\text{a. } & [m] [+\text{ANTERIOR}, –\text{CORONAL}] \\
\text{b. } & [n] [+\text{ANTERIOR}, +\text{CORONAL}] \\
\text{c. } & [\tilde{n}] [–\text{ANTERIOR}, +\text{CORONAL}] \\
\text{d. } & [\tilde{\text{e}}] [–\text{ANTERIOR}, –\text{CORONAL}] \\
\end{align*}\]

These sounds do not have equal frequency or distribution in English. The closest approximation to a palatal nasal in English occurs in a word like \textit{onion}. The velar nasal, though it can occur medially and finally, cannot occur initially. The three primary positions in (31), namely, (31a), (31b), and (31d), are also the positions for the six stop consonants in English. Consider the following (recall that [+VOICED] means that the vocal cords are vibrating and [–VOICED] means they are not):

\[(32) \quad \begin{align*}
\text{a. } & [p] [+\text{ANTERIOR}, –\text{CORONAL}, –\text{VOICED}] \\
\text{b. } & [b] [+\text{ANTERIOR}, –\text{CORONAL}, +\text{VOICED}] \\
\text{c. } & [t] [+\text{ANTERIOR}, +\text{CORONAL}, –\text{VOICED}] \\
\text{d. } & [\text{d}] [+\text{ANTERIOR}, +\text{CORONAL}, +\text{VOICED}] \\
\text{e. } & [k] [–\text{ANTERIOR}, –\text{CORONAL}, –\text{VOICED}] \\
\text{f. } & [\text{g}] [–\text{ANTERIOR}, –\text{CORONAL}, +\text{VOICED}] \\
\end{align*}\]

Notice the succinctness of this method of characterization. As we noted in previous sections, a letter like \textit{p} is a representation for the sound [p], which itself is an abbreviation for a constellation of phonological features. Further, all those features relate to the structure of the human vocal apparatus so that they comprise natural classes of sounds. As it turns out, it is precisely those natural classes that are operative in phonological processes. For example, consider the following words:

\[(33) \quad \begin{align*}
\text{a. } & \text{impossible, imbalance, immeasurable} \\
\text{b. } & \text{intangible, indiscrete, innumerable} \\
\text{c. } & \text{incongruent, ingratitude}
\end{align*}\]

Observe that the prefix meaning ‘not’ is pronounced in three ways:
(34)  a.  [im] before words beginning with sounds that are [+ANTERIOR, –CORONAL], namely, [p, b, m]
    b.  [in] before words beginning with sounds that are [+ANTERIOR, +CORONAL], namely, [t, d, n]
    c.  [iÊ] before words beginning with sounds that are [–ANTERIOR, –CORONAL], namely, [k, g, Œ]

This is, of course, not arbitrary. Sounds assimilate to each other, that is, they tend to become like each other, when they are adjacent. We can formulate the following rule for English:

(35)  If a prefix ends in a nasal, assimilate that nasal to the following consonant sound.

(35) accounts for the occurrence of the bilabial nasal [m] before the bilabial stops [p] and [b], of the alveolar nasal [n] before the alveolar stops [t] and [d], and of the velar nasal [Ê] before the velar stops [k] and [g]. Notice that this distribution corresponds to the natural classes formed by combinations of the features [±ANTERIOR] and [±CORONAL] in (31) and (32). We find verification for this distribution in the occurrences of the Latin prefix con– and the Greek prefix syn– both meaning ‘with’ or ‘together’:

(36)  a.  [m] compatible, combustible, community
    b.  [n] continue, condense, connect
    c.  [Ê] conclude, congruent

(37)  a.  [m] sympathy, symbiosis, symmetry
    b.  [n] syntax, syndrome, synnema
    c.  [Ê] synchrony, syngamy

We also find other cases of assimilation in the phonology of English. For example, note the alternation of [p] and [b] in the root of inscription, scripture as opposed to scribe, scribble; the alternation of [s] and [z] to indicate the plural of taps, bets, picks as opposed to tags, beds, pigs. Similar examples are very common in the languages of the world. In view of this, we can formulate the following principle for UG:

(38)  a.  Assimilate [+NASAL] consonants to the place of articulation of a following stop, that is, to the features [ANTERIOR] and [CORONAL].

Of course, (38) is directly related to the nature of the human vocal apparatus. It is more natural to make adjacent features similar because it is easier to articulate them when they are similar. Children engage in such simplification from the earliest stages of language acquisition when their vocal apparatus is still not completely formed. For example, they say things like gig kig for big pig assimilating the stops to the same place of articulation because it is too difficult for them to articulate a syllable like big which begins with an anterior stop and ends with a nonanterior one; it is easier to make them both the same, so children say gig.
With regard to levels of adequacy, the above characterization proceeds as follows. If it stops at simply noting the data in (33), then only observational adequacy would be attained. If it stops at the rule (35), which describes (31) in generalized terms applicable to other data (cf. (36)), then descriptive adequacy would be attained. If the characterization continues to principle (38) and relates (38) to the structure of the human vocal apparatus, then explanatory adequacy has been attained.

The significance of the highest level is that one can separate what is expected to occur in natural language from what is not expected to occur. Also, at the level of explanatory adequacy, the real nature of apparent exceptions is often clarified. To see this, notice that the rule (35) is not always followed, even in English. Consider the following data involving the occurrence of the element non—meaning ‘not,’ which is also of Latin origin:

(39)  
a. [n] nonperson, nonbiodegradable, nonman  
b. [n] nontaxable, nondelivery, nonnative  
c. [n] noncombat, nongaseous

Notice that non is always pronounced with a final [n]. We must say, therefore, that, if non is a prefix, it is an exception to (35). However, the matter does not stop there. The prefixes in– and con– are of Latin origin, and, in Latin, they also function as prefixes, though they are related to independent words (in and cum). Similarly, syn–, which is of Greek origin, functions as a prefix in Greek, though it is related to an independent Greek word (syn). The element non, on the other hand, never functions as a prefix in Latin; it occurs only as a separate word meaning ‘not’ and in a few compound words. Even in English, the merger of non with the following word is not as complete as the merger with in– or con– or syn–. Notice the slight pause and shift of articulatory posture after saying non in the examples of (39). Such hesitation and adjustment does not occur in the examples in (33), (36) and (37). This indicates that our characterization has missed something. Even in English, it is probably wrong to consider non a prefix, though it looks like one. If we treat words like nonman as compounds like snowman or manhole, then non is not a prefix and, accordingly, is not subject to rule (35). Thus, an apparent exception, after closer examination, is seen not to be an exception at all.

The significance of the above discussion is that it illuminates the nature of linguistic processes and clearly indicates that languages are not governed solely by arbitrary conventions. As a further example, consider the following.

The past tense in English verbs is variously pronounced [t] as in kicked, [d] as in hugged, and [Cd] as in hunted. The occurrence of each of these variants is predictable in terms of the phonetic environment in which the past tense occurs. If it occurs after a voiceless consonant, it is realized phonetically as [t], e.g., cooked, hoped, and laughed; if it occurs after a voiced consonant or after a vowel, it is realized phonetically as [d], e.g., begged, rubbed, and loved; and, if it occurs after [t] or [d] themselves, it is realized phonetically as [Cd], e.g., prodded, pointed, and suggested. We can state the following generalizations ([æ] = the vowel in bat).
This distribution is, of course, largely an assimilatory process (and notice, incidentally, how irrelevant and unrevealing the spelling of the past tense –ed is to the linguistic analysis). The exception in distribution is apparently the last environment (40c) where [t, d] do not completely assimilate in words endings in [t, d] (pointed and prodded). However, other facts of English indicate that this distribution is, in fact, not exceptional. English has no final long sounds; there is no difference between but and butt from a phonological point of view. Furthermore, final stops in English are unreleased, that is, they are articulated without full explosion (compare the p in pit with the p’s in tiptop). Therefore, in order to keep the past tense suffix as a recognizable and pronounceable entity in a word, English must give it the status of a separate syllable in words like pointed and prodded where it would otherwise not be possible (*pointt and *prodd).

It is clear from the above examples that the correct formation of the past tense in English is not arbitrary for regular verbs (that the past tense of go is went is irregular and unpredictable and therefore marked). Of course, it is completely accidental that English should choose the alveolar stop consonant series [t]/[d]/[Cd] to signal past tense. However, given the choice of alveolar stops, the distribution of these three sounds is not arbitrary. As we have seen, the nature of the human vocal apparatus makes certain combinations of sounds difficult or impossible to articulate. For example, it is not possible to articulate a long unreleased final stop. If the past tense is signaled by an alveolar stop, and that suffix is added to a verb whose root already ends in an alveolar stop, then there is no choice but to affix the [Cd] option. The past tense of hunt cannot be [huntt] or [huntd], both of which end in consonant clusters that are impossible for English. It must be [huntCd]. For this reason, children often say hurted and even goed or goded (rather than went), although they have never heard such forms. If these verbs were regular, the past tense would be exactly what children invent. In language acquisition children immediately overapply a rule. Later, they begin the process of making finer and finer distinctions, including learning the marked exceptions. In short, for a good many verb forms, the past tense is completely predictable given the choice of alveolar stop and the constraints on human articulation. Children do not have to learn the past tense of every verb separately, only of the irregular verbs.

This analysis offers a real explanation for the rapidity with which children acquire knowledge of the past tense in English. The explanation is given in terms of UG, which is simply a reflection of the human language apparatus. Not only does this description of past tense explain the rapidity of acquisition, it also explains why children regularly utter forms they never could have heard like hurted and goed and goded. Children do not know yet that these are irregular verbs. They have realized that English arbitrarily signals past tense by the suffixation of an alveolar stop to the verb root. Their intuitive linguistic competence dictates that the distribution of the various alveolar stops must obey the constraints on articulation. Therefore, children say hurted and goed. In fact, irregular forms take children a long time to master, precisely because they violate general principles.
1.7 LANGUAGE VARIATION

All human languages are based on UG, a specification of the kinds of rules and features that can exist in human languages. As we have seen, this specification directly reflects the nature of the human language apparatus, which includes the organs of speech and hearing and the brain. The existence of UG accounts for the fact that any human being can acquire any human language as a native language with equal facility.

The principles in UG are available to virtually all humans; in fact, there are only three groups of children who fail to acquire language normally. The first group includes those children who have been kept severely isolated: one cannot acquire a language if one is not exposed to a language. The second group includes the profoundly retarded, children who fail to attain a mental age above two. Lastly, psychotic children show severe limitations in native language acquisition, usually because they do not attend to language when they are exposed to it. Since all of these groups are extreme cases, absence of the ability to acquire language is exceedingly rare in the overall population.

It is important to note also that language can develop quite normally even in cases of severe sensory and motor deprivation. Children who are deaf, mute, and blind can acquire language, as the accomplishments of Helen Keller attest.

Given the nature of children who fail to acquire a native language and the presence of language in deaf, mute, and blind children, it is clear that the major component of UG is neurological. There is something about the nature and functioning of the human brain that makes human language possible. For this reason, general principles of grammar are very difficult to discover. It is well to keep this in mind, as we explore the mysteries and intricacies of grammar in later chapters.

In the search for the grammatical principles which underlie all human languages, it is easy to be misled. There are many superficial differences among the world’s languages, and even among dialects of the same language. Cultural and ethnic diversity among different groups of people add even more superficial complexities. Students new to linguistics are quick to focus on these superficial variations and tend to overestimate their importance. For example, because different languages sound so different, students often think that some are easier to pronounce than others. This may be true when one acquires a second language as an adult, but it is not true for native language acquisition: all other things being equal, no language is harder for a child to pronounce than another. Also, although different languages organize objects in the world differently, there is no organization that cannot be acquired by every child. The fact that nomadic tribes living in deserts have many words for different kinds of wind and sand simply tells us that wind and sand are an important feature of desert life. That is hardly surprising news.

Despite the enormous variety among the world’s languages and the people who speak them, any child could potentially acquire any language as a native language. This fact is of crucial significance in modern linguistic theory. While there is currently much debate over what the principles of UG are and what grammatical model best expresses them, virtually all linguists agree that the grammars of human languages reflect innate, biologically determined characteristics of human beings.
1.8 LANGUAGE AND CULTURE

Culture and language are totally different objects of inquiry. Culture is conventional, subject to whim and fancy, and alterable by decree. For example, what is considered appropriate attire on a airplane or in a concert hall today would not have been accepted twenty years ago. The number of taboo words and taboo subjects has dropped precipitously in the same period. It is possible to decide whether or not we can burn the flag, address elders by their first names, eat meat on Friday, or publicly breast-feed an infant. These aspects of culture, like all others, endure or change at the whim of the society that institutionalizes them.

The structure of language, on the other hand, is not conventional, not subject to whim and fancy, and not alterable by decree. Consider, for example, the following differences between statements and direct questions:

<table>
<thead>
<tr>
<th>Statements</th>
<th>Direct Questions</th>
<th>Ungrammatical Direct Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>John is going.</td>
<td>Is John going?</td>
<td></td>
</tr>
<tr>
<td>John has gone.</td>
<td>Has John gone?</td>
<td></td>
</tr>
<tr>
<td>John will go.</td>
<td>Will John go?</td>
<td></td>
</tr>
<tr>
<td>John went.</td>
<td>Did John go?</td>
<td>*Do John went?</td>
</tr>
<tr>
<td>John snores.</td>
<td>Does John snore?</td>
<td>*Do John snores?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*Snores John?</td>
</tr>
</tbody>
</table>

It takes children a relatively long time to work out the details of forming direct questions in English, and the insertion of do causes people learning English as a second language considerable difficulty. So, why not get rid of these processes? After all, in indirect questions, these processes don’t apply. Consider the following indirect questions:

a. Ask Mary if John is going.
b. Ask Mary if John has gone.
c. Ask Mary if John will go.
d. Ask Mary if John went.
e. Ask Mary if John snores.

Why not form direct questions in the same way, i.e., simply prefix statements with a word like if as many other languages do? For example, let us decree that all the following will be grammatical direct questions from now on:
Think of the aggravation that people would be spared. Of course, the idea is absurd. We cannot change how we form direct questions in English by legislation, mutual consent, or even conspiracy.

Language reflects culture in only the most superficial ways. For example, specific kinship terminology is influenced by culture. For example, in ancient Rome, there were two different words for uncle, *avunculus* (mother’s brother) and *patruus* (father’s brother) because the distinction was important in Roman society. In the evolution of Latin to the modern Romance Languages, e.g., French, the distinction was lost because it was no longer relevant. Such subtleties and changes in usage are common in languages, as are the societal conventions that dictate what is proper (whether to say *I need to use the bathroom* or *I gotta take a leak*, for example). Thus, the fact that a language has two words for *uncle* is entirely conventional and based on societal concerns, whereas the structure of languages conforms to the capacities and limitations of human cognitive ability, which is entirely independent of social conventions. It is not an accident, for example, that the sentences of every human language can be broken up into phrases. The fact is that the human brain cannot process unstructured material very well so sentences must be organized according to structural principles that all languages share. The manipulation of phrases is also dictated by such structural principles. Notice that it is phrases that invert to form direct questions in English, not words:

(45) | Statements                          | Direct Questions                   |
---|-------------------------------------|-----------------------------------|
    | John is going.                      | Is John going?                    |
    | That man is going.                  | Is that man going?                |
    | The man laughing is going.          | Is the man laughing going?        |
    | The man who is laughing is going?   | Is the man who is laughing going? |
    | The man who is laughing is going?   | *Is the man who is laughing going?|

Every native speaker of English knows that the italicized sequences in (45) are phrases. Of course, their knowledge is generally unconscious as we have seen. If asked to identify the subjects in those sentences they might even get the answer wrong. But, at an unconscious level, they know exactly what all the subjects are because they know it is possible to replace all of them with the pronoun *he*. Further, they know they can replace *the man laughing* with *he*, but not just *the man*. The ungrammaticality of *He laughing is going* has nothing to do with English per se; it is ungrammatical because it violates the structural principles on which all human languages are based.

### 1.9 SUMMARY

As we have seen, there is a high level of abstractness associated with the characterization of linguistic competence; principle (21) – that the rules of human language are structure dependent –
is hardly a subject of discussion among five–year–olds. Trying to explain it even to an educated adult is not easy. Also, there is a large measure of creativity associated with linguistic performance; most of the sentences children experience are novel. Despite this, many psychologists and linguists believed, until quite recently, that the linguistic abilities of human beings could be attributed to a complex interaction of elementary learning mechanisms, such as imitation, conditioning, association, and the like. Biologists have also shared this belief and attempted to document the separate skills needed to explain human language by citing antecedents found elsewhere in the animal kingdom. However, it has now become quite clear that the acquisition and use of language by ordinary human beings cannot be explained as the product of simple learning mechanisms, each with a precedent elsewhere in the animal kingdom. This is substantiated by a number of observations which we summarize here.

First, human beings are capable of learning any of the world’s languages. Obviously, a child is not predestined to acquire a specific language but learns the language of the community into which he has been placed by chance.

Second, from the inception of speech, a child does not merely imitate his parents or respond to stimuli but produces entirely novel sound sequences, most of which he has not specifically heard. One of the outstanding characteristics of both language acquisition and use is their productivity. Children say things like *I goed there*, which they clearly have never heard.

Third, all normal children learn their language with remarkable rapidity and uniformity; and, even non–normal children, such as those who suffer from severe sensory deprivation, acquire linguistic proficiency. A human can be deaf, mute, and blind and still acquire a human language.

Fourth, the data on the basis of which children learn their language is of a highly fragmentary sort; many of the sentences they hear deviate considerably from perfect well–formedness. Despite this, all children learn to distinguish those utterances which are grammatical sentences from those which are not. And all children, despite their particular home environment, arrive at essentially the same internalized grammar.

Fifth, while the members of the linguistic community do correct children on occasion, the level of instruction never approaches the order of complexity and abstractness which must be assumed to account for the normal use of language.

Sixth, there is no one–to–one correspondence between sound and meaning in any human language, whereas all known animal communication systems have very restricted one–to–one correspondences between signals and meaning. Human languages all have sound sequences that mean more than one thing, i.e., ambiguities like (46); they also have multiple sound sequences that can mean the same thing, i.e., paraphrases like (47).

(46)  

| a. | It’s too hot to eat. |
| b. | Each of the sisters said that they turned on their brothers yesterday. |
(47)   a. The boy called up the girl.
   b. The boy called the girl up.

On the basis of these observations and many others, it appears that language acquisition is possible in children because all human languages, despite their superficial diversity, are of a universally well–defined type and because all children have an innate mental capacity to learn this particular type of communication system. Consequently, the essential problem for linguistics is to construct a theory of human language which is sufficiently rich to account for the diversity among the world’s languages, but which, at the same time, is constrained enough to account for the facts of ordinary language acquisition. The formal representation of such a theory entails a grammar of linguistic universals or UG, the investigation of which necessarily links the study of language structure to the study of human psychology and biology, and ultimately, to the study of the nature of man. The innateness hypothesis of language acquisition claims only that children are able to learn their native language because human languages all reflect innate human abilities.

A beginning student of linguistics must realize that it is of crucial importance to study the structure of sentences with a view toward describing what can and cannot be said in a language, rather than prescribing what should and should not be said, and to approach the problem of grammatical characterization with a view toward discovering the underlying principles upon which languages are based. The approach in theoretical linguistics is consequently very different from the approach taken in most language classes in the schools, including language arts classes and English classes, even though some of the same terminology is used. Theoretical linguists do not generally do grammatical analysis to help improve a teacher’s ability to teach languages or a student’s ability to learn languages. Theoretical linguists deal with native speakers who already completely know their native language. Theoretical linguists do grammatical analysis in an effort to characterize native linguistic competence which they believe is directly related to the nature of human beings. Thus, it is crucially important to try to find out what exactly causes some sentences to be grammatical and others, ungrammatical.

This approach to the study of language seeks to explain linguistic phenomena, not merely observe and describe their existence. As we saw above in the characterization of the past tense in English, it is possible to attain the level of explanatory adequacy by relating the distribution of [t]/[d]/[Cd] in regular English verbs to principles of UG which are based on the structure and function of the human vocal apparatus. As a result, this characterization of the past tense attains the level of explanatory adequacy because it relates linguistic phenomena to the nature of man. Further, it offers an explanation for why children learn the past tense so rapidly despite their lack of instruction and why they regularly produce forms they never could have heard. In actuality, the characterization predicts that children will say hurted and goed. Of course, explanation leading to prediction is precisely what all science is about.
EXERCISES FOR CHAPTER ONE

1. What must a descriptive grammar of English say about the word *up* in the following sentences? Can you justify your opinions?

a. The price has been upped.
b. They can’t handle the ups and downs of life.
c. He stood up his date.
d. Bob has to be the upest guy on the team.
e. He lives up the street.
f. Let’s up the ante.
g. Sue gets up her children at six.
h. It’s up for grabs.
i. The surf is up.
j. (1) He put up the money.
   (2) He put the money up.
   (3) He put the money up there.
   (4) He put the money up in that case.

2. All of the following sentences are ambiguous. How can you disambiguate them?

a. The thief hit the lady with the hat.
b. The repair man will look up the street.
c. John left the house messy.
d. The prisoner of war spoke foolishly.
e. John slipped on the boots in the kitchen.
f. They hired Spanish teachers.
24

g. They are all finished.

h. They do so love a good meal.

i. We made them idols.

j. They made idols.

3. The following are grammatical English sentences. Why are they so difficult to understand?

a. Spain was where district and provincial administrators were concerned a country of corrupt officials.

b. The horse raced past the barn fell.

c. Where Al had had had Sue had had had had had had had the teacher’s approval.

d. Americans Italians and Germans really like.

e. That that is is that that is not is not that it it is.

4. The following excerpts are from songs, games, magazines, and various other sources. What makes them special? Turn them into sentences that are unremarkable.

a. They need to adore me so Christian Dior me; it’s vital you sell me, so Machiavell’ me.

b. Freedom from incrustations of grime is contiguous to rectitude.

c. Like my mother is a total space cadet, she like makes me do the dishes and clean the cat box, I am sure, that’s like gross, barf out!

d. I have hear of yo and your classes on languages for foreigner people. I am very interesting about take some courses on your school. I have the necessity to learn English for development very well in my profession in Mexico City. Gratefully beforehand any information.

e. Nowadays, the only sexuality about which journalese is coy tends to be homosexuality, and that is adequately covered by he has no close female friends or he is not about to settle down.

5. Find the words which express the main idea in each of the following sentences. If you can, do this by identifying the subject and the main verb.
a. When the dancer faces the audience and with one foot describes a *rond de jambe à terre en dedans* so that the foot describes on the ground a semi-circle from back to front, the head should be inclined to the same side as the foot that makes the movement.

b. To be born, or at any rate bred, in a hand–bag, whether it had handles or not, seems to me to display a contempt for the ordinary decencies of family life that reminds one of the worst excesses of the French Revolution.

c. It was from these missions the Jesuit fathers carried the word of God to the high and undiscovered plateau to those Indians still existing in their natural state and received in return martyrdom.

d. When in the Course of human Events, it becomes necessary for one People to dissolve the Political Bands which have connected them with another, and to assume among the Powers of the Earth, the separate and equal Station to which the Laws of Nature and of Nature’s God entitle them, a decent Respect to the Opinions of Mankind requires that they should declare the causes which impel them to the Separation.

e. In vertebrates, mechanisms for maintaining body temperature by adjusting heat production and heat loss, a feat lower animals, who are at the mercy of their environment, cannot achieve, have evolved.

f. In looking forward to the moment which is intended to terminate the career of my public life, my feelings do not permit me to suspend the deep acknowledgment of that debt of gratitude which I owe to my beloved country for the many honors it has conferred upon me.

g. As we are now entering upon a book in which the course of our history will oblige us to relate some matters of a more strange and surprising kind than any which have hitherto occurred, it may not be amiss in the prologomenous or introductory chapter to say something of that species of writing which is called the marvelous.

6. Why do linguists make a distinction between linguistic competence and linguistic performance? Why is competence the focus of linguistic description? Should it be?

7. Itemize some of the differences between native language acquisition and second (foreign) language acquisition. Consider characteristics of the learner and the circumstances of learning.

8. Here are two typical definitions from traditional grammar:
The **subject** of a sentence is the phrase which specifies the topic of the sentence. The **direct object** of a verb specifies the person or thing directly affected by the action described in the verb.

What problems arise when these definitions are applied to the subjects and direct objects in the following sentences?

a. John burned the money.

b. John earned the money.

c. Sue suffered a blow to the head.

d. This book reads well.

e. Bill received a promotion.

9. Here are some further definitions from traditional grammar of three parts of speech:

A **verb** is a word that expresses an action, occurrence, or state of being.

A **noun** is the name of a person, place, or thing.

An **adjective** is a word that describes a noun.

Using these definitions, find the verbs, nouns, and adjectives in the following sentences:

a. They won on their final at–bat.


c. He Fred Astaired her around the ballroom.

d. *The River* is not your average save–the–farm film.

e. All carry–on luggage must be stowed.

f. These French fries are so ketchuped–up, they’re soggy.

Can you think of other ways of defining the parts of speech? Try to find criteria like the following:

A **verb** is a word that can carry time distinctions (*play*, *played*).
A NOUN is a word that can carry number distinctions (book, books).
An ADJECTIVE is a word that can be compared (tough, tougher, toughest).

10. Each of the following pairs of unpunctuated sentences consists of a statement and a yes/no question, which is a question to which one can get a yes or no answer. As a native speaker of English you know which member of each pair is the yes/no question. How do you recognize a yes/no question? Formulate a rule for forming a yes/no question.

a. (1) will that man go
(2) that man will go

b. (1) the little girl has gone
(2) has the little girl gone

c. (1) the boy with the red hair isn’t going
(2) isn’t the boy with the red hair going

d. (1) all of them went
(2) did all of them go

e. (1) could there be more than one right answer
(2) there could be more than one right answer

Having formulated a rule for forming yes/no questions in English, consider how you might teach a four–year–old child that rule.
CHAPTER TWO: PHONETICS AND PHONOLOGY

PHONETICS and PHONOLOGY are the two branches of grammar which are concerned with the study of the sounds of human language. The distinction between the two fields is as follows: phonetics deals primarily with the speech sound itself, including the way in which it is produced, transmitted, and perceived; while phonology deals more with the organization of speech sounds into sound systems. The difference is similar to the difference between studying the materials out of which buildings are constructed (e.g., bricks, concrete, steel, etc.) and studying the way in which a building is constructed out of these materials (e.g., by alternating a layer of brick with a layer of concrete, by encasing the steel in concrete, etc.). PHONETICIANS study the raw materials, the sounds; PHONOLOGISTS study the systems formed from these sounds.

2.1 PHONETICS

PHONETICIANS describe and classify the sounds of human language in the following three ways: (i) in terms of the way in which they are produced by the vocal apparatus; (ii) in terms of the physical properties of the sound wave emanating from the speaker; and (iii) in terms of the effect the sound wave has on the various parts of the ear. These three methods of description and classification are known respectively as ARTICULATORY phonetics, ACOUSTIC phonetics, and AUDITORY phonetics. By far, the most common of the three is articulatory phonetics; hence, in the discussions which follow, the terminology of articulatory phonetics will be employed.

The diagram in Figure One represents a cross–section of the human head, showing the parts of the vocal apparatus. In the production of speech sounds, the most important of these parts are the vocal cords. These are two elastic membranes located in the larynx or Adam’s Apple.

In normal breathing, air is forced from the lungs, up the trachea, through the vocal cords, and out of the mouth or the nose or both. If the air is not obstructed in any way by the parts of the vocal apparatus, then no sound will be produced. Conversely, when one or more of the parts of the vocal apparatus form an obstacle in the path of the air, then a sound results.

2.1.1 VOWELS

There are two basic types of sound segments in human speech: VOWELS and CONSONANTS. Vowels are typically produced when the air is modified by the vibration of the vocal cords and when the tongue is held in specific positions in the mouth. The vibration of the vocal cords is known as VOICING. Sounds articulated with the vocal cords vibrating are [+VOICED]; those without, are [–VOICED]. Voicing is a feature of all English vowels, whereas the position of the tongue is what distinguishes one vowel from another. For example, the sound of a in father is produced when the tongue is in a low position in the back of the mouth, and the sound of I in machine is produced when the tongue is in high position in the front of the mouth. In the production of both vowels, the vocal cords are vibrating.
A chart of some vowel sounds, specified by the relative positions of the tongue, is given in Figure Two. The symbols in brackets are those used by phoneticians all over the world. These symbols are independent of specific languages and spelling conventions. Thus, the symbol [i] represents the sound of I in the English word *machine*, of *ee* in the English word *beet*, of *ei* in the German word *sieben*, or *ie* in the French word *vie*, of I in the Spanish word *hijo*, etc.
FIGURE TWO: ENGLISH VOWELS

<table>
<thead>
<tr>
<th>FRONT</th>
<th>CENTRAL</th>
<th>BACK</th>
</tr>
</thead>
<tbody>
<tr>
<td>[i] as in beat</td>
<td></td>
<td>[u] as in boot</td>
</tr>
<tr>
<td>[ʌ] as in bit</td>
<td></td>
<td>[ʊ] as in put</td>
</tr>
<tr>
<td>[e] as in bait</td>
<td></td>
<td>[o] as in boat</td>
</tr>
<tr>
<td>[ɛ] as in bet</td>
<td>[ɔ] as in butted</td>
<td>[ ] as in bought</td>
</tr>
<tr>
<td>[æ] as in bat</td>
<td>[ʌ] as in but</td>
<td>[a] as in pot</td>
</tr>
</tbody>
</table>

The features [±HIGH], [±FRONT], etc. in Figure Two contain a number of redundancies, that is, unnecessary duplications. For example, there seems to be no difference between [–BACK] and [+FRONT]. Modern linguistics, in an attempt to reach the highest possible level of descriptive adequacy, seeks to remove such redundancies from its descriptions. Therefore, it is more common today to replace the traditional classification in Figure Two with the one in Figure Three.

FIGURE THREE: DISTINCTIVE FEATURES FOR ENGLISH VOWELS

<table>
<thead>
<tr>
<th>i</th>
<th>w</th>
<th>e</th>
<th>e</th>
<th>æ</th>
<th>u</th>
<th>½</th>
<th>o</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH</td>
<td>+</td>
<td>+</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>+</td>
<td>+</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>LOW</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>+</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>BACK</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>ROUND</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>TENSE</td>
<td>+</td>
<td>–</td>
<td>+</td>
<td>–</td>
<td>–</td>
<td>+</td>
<td>–</td>
<td>+</td>
<td>–</td>
</tr>
</tbody>
</table>

In addition to the unitary sounds charted above, English contains a number of DIPHTHONGS, which are vowels followed by a GLIDE ([w] or [y]). The true diphthongs are [iy] as in boy and soil; [ay] as in sigh, nice, guy, lie, lye, sign, aisle, and choir; and [aw] as in cow, house and doubt.

In most dialects, the [–LOW, +TENSE] vowels of English are also articulated with a glide, particularly in word final position: [iy] see, [ey] say, [uw] sue, [ow] sew.

The definitions for the distinctive features of English vowels are as follows:
HIGH – NONHIGH — High sounds are produced by raising the body of the tongue above the level that it occupies in neutral position; nonhigh sounds are not produced with such a raising of the body of the tongue.

LOW – NONLOW — Low sounds are produced by lowering the body of the tongue below the level that it occupies in neutral position; nonlow sounds are produced without such a lowering of the body of the tongue.

BACK – NONBACK — Back sounds are produced by retracting the body of the tongue from the neutral position; nonback sounds are produced without such a retraction.

TENSE – NONTENSE (LAX) — Tense sounds are produced with a deliberate, accurate, and maximally distinct articulatory gesture that involves considerable muscular effort; lax sounds are produced rapidly and somewhat indistinctly.

ROUND – NONROUND — Rounded sounds are produced with a narrowing of the lips; nonrounded sounds are produced without such narrowing.

### 2.1.2 CONSONANTS

#### 2.1.2.1 STOPS

Consonants are produced in a variety of different ways. Some involve the complete stoppage of the air flow at some point in the vocal tract. Such consonants are known appropriately as **STOPS**. These include [pʰ] (the sound of p in *pan*), [tʰ] (the sound of t in *tan*), and [kʰ] (the sound of c in *can*). The point in the vocal tract at which the stoppage of air occurs is used to distinguish one stop consonant from another. [pʰ], which is produced by stopping the air with both lips, is called a **BILABIAL** stop; [tʰ], which is produced by placing the tongue against the alveolar ridge (see Figure One), is called an **ALVEOLAR** stop; and [kʰ], which is formed with the tongue against the velum, is called a **VELAR** stop.

In the production of [pʰ], [tʰ], and [kʰ], the vocal cords do not vibrate; hence, these sounds are called **VOICELESS** ([-VOICED]) stops. Other stops, for example, [b] as in *bet*, [d] as in *debt*, and [ɡ] as in *get*, are formed by a complete stoppage of the air flow with an accompanying vibration of the vocal cords. These stops are called **VOICED** ([+VOICED]). A chart of some stop consonants, specified according to this method of classification, as well as the features [±CORONAL] and [±ANTERIOR] discussed in Chapter One, is given in Figure Four.

<table>
<thead>
<tr>
<th>MANNER OF ARTICULATION</th>
<th>PLACE OF ARTICULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ANTERIOR</td>
</tr>
</tbody>
</table>

**FIGURE FOUR: ENGLISH CONSONANTS, LIQUIDS, AND GLIDES**
<table>
<thead>
<tr>
<th>STOP</th>
<th>[–VOICED]</th>
<th>[+VOICED]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pʰ (pun)</td>
<td>p (spun)</td>
</tr>
<tr>
<td></td>
<td>b (bun)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STOP</th>
<th>[–VOICED]</th>
<th>[+VOICED]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>tʰ (ton)</td>
<td>t (stun)</td>
</tr>
<tr>
<td></td>
<td>d (done)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STOP</th>
<th>[–VOICED]</th>
<th>[+VOICED]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ʰ (kill)</td>
<td>ʰ (kill)</td>
</tr>
<tr>
<td></td>
<td>k (scum)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>g (gum)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STOP</th>
<th>[–VOICED]</th>
<th>[+VOICED]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>? (o?o)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FRI CATIVE</th>
<th>[–VOICED]</th>
<th>[+VOICED]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f (fat)</td>
<td>v (vat)</td>
</tr>
<tr>
<td></td>
<td>» (thin)</td>
<td>ð (then)</td>
</tr>
<tr>
<td></td>
<td>s (seal)</td>
<td>z (zeal)</td>
</tr>
<tr>
<td></td>
<td>ź (shoe)</td>
<td>ź (azure)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AFFRICA TIVE</th>
<th>[–VOICED]</th>
<th>[+VOICED]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ʰ⁴ (Chet)</td>
<td>ʰ⁴ (jet)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NASAL</th>
<th>[–VOICED]</th>
<th>[+VOICED]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>m (sum)</td>
<td>n (sun)</td>
</tr>
<tr>
<td></td>
<td>ŋ (onion)</td>
<td>Ė (sung)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LIQUID</th>
<th>[–VOICED]</th>
<th>[+VOICED]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>l (lot)</td>
<td>r (rot)</td>
</tr>
<tr>
<td></td>
<td>D (cater)</td>
<td>Ū (pole)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GLIDE</th>
<th>[–VOICED]</th>
<th>[+VOICED]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>achte (when)</td>
<td>y (yet)</td>
</tr>
<tr>
<td></td>
<td>w (wet)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>h (hen)</td>
</tr>
</tbody>
</table>

2.1.2.2 FRI CATIVES
A second group of consonants, called **FRICATIVES**, is formed by a closure in the vocal tract, which, though not complete as in the articulation of stops, is sufficiently constricted to cause turbulence in the air flow, thereby producing a hissing sound. This group includes such sounds as [f], [v], [s], and [z]. Like stops, fricatives are classified according to the point in the vocal tract at which the obstruction in the air flow occurs. For example, [f] and [v] are produced by a constriction formed with the lower lip and upper teeth; they are called **LABIODENTAL** fricatives. [θ] and [ð], produced by a constriction behind the upper teeth, are **INTERDENTAL**; [s] and [z], produced by a constriction against the alveolar ridge, are **ALVEOLAR**; and, [š] and [ž], produced by a constriction against the palate, are **PALATAL**.

### 2.1.2.3 AFFRICATES

Closely allied to the articulation of stops and fricatives is a group of consonants called **AFFRICATES**. These consonants combine a complete closure at some point in the vocal tract, as in the articulation of stops, with a turbulent release that produces a hissing sound, as in the articulation of fricatives. Examples of these consonants are [ç], the sound of *ch* in *chunk*, and [ʒ], the sound of *j* in *junk*. These are the only affricates in English, but there are several others in the remaining languages of the world.

### 2.1.2.4 NASALS

A fourth group of consonants, called **NASALS**, are produced by a closure in the mouth and a simultaneous lowering of the velum so that the air escapes through the nasal passage (see Figure One). English has three nasal consonants. They are distinguished from each other by the point in the mouth where the closure is made. [m], the sound of *m* in *Kim*, is a bilabial nasal; [n], the sound of *n* in *kin*, is an alveolar nasal; and [ŋ], the sound of *ng* in *king*, is a velar nasal. Each of the English nasals is a voiced consonant.

### 2.1.3 LIQUIDS AND GLIDES

Vowels and consonants are distinguished from each other by the following features:

**VOCALIC – NONVOCALIC** — Vocalic sounds are produced with an oral cavity in which the most radical constriction does not exceed that found in the high vowels [i] and [u], and with the vocal cords positioned so as to allow spontaneous voicing; in producing nonvocalic sounds one or both of these conditions are not satisfied.

**CONSONANTAL – NONCONSONANTAL** — Consonantal sounds are produced with a sustained vocal tract constriction at least equal to that required to produce fricatives; nonconsonantal sounds are produced without such a constriction.
In addition to consonants and vowels, languages contain two other classes of sounds, **LIQUIDS** and **GLIDES**. The four groups of sounds are distinguished as follows:

<table>
<thead>
<tr>
<th>FIGURE FIVE: THE MAJOR PHONOLOGICAL CATEGORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEATURES</td>
</tr>
<tr>
<td>CONSONANTAL</td>
</tr>
<tr>
<td>VOCALIC</td>
</tr>
</tbody>
</table>

### 2.1.3.1 LIQUIDS

**LIQUIDS** include [l], the sound of *l* in *low*, and [r], the sound of *r* in *row*. [l] is produced with a complete closure made by the center of the tongue at the alveolar ridge, in such a way that the air is allowed to pass out of the mouth along the sides of the tongue. Since the air passes along the sides of the tongue, l–sounds are often referred to as **LATERAL** consonants. In contrast to the articulation of [l], [r] usually involves a closure, or near–closure, made with the sides of the tongue, so that the air escapes from the mouth over the central portion of the tongue.

An *r* sound can also be produced by making the tongue **FLAP** against the alveolar ridge. This sound, represented as [D], is heard instead of [tʰ] or [d] in words like *water* and *ladder*.

### 2.1.3.2 GLIDES

The last group of sounds includes [y], the sound of *y* in *yell*, and [w], the sound of *w* in *well*. These consonants are either called **GLIDES** or, because of their similarity to the vowels [i] and [u], **SEMIVOWELS**. Typically, they are produced like vowels, e.g., they do not involve a complete stoppage of the air flow, but are distributed like consonants, e.g. they occur before and after vowels, as in the word *wow*.

The remaining features necessary to describe all of the above sounds are the following:

**SONORANT – NONSONORANT (OBSTRUENT)** — Sonorants are sounds produced with a vocal tract cavity configuration in which spontaneous voicing is possible; obstruents are produced
with a cavity configuration that makes spontaneous voicing impossible. [Note: sonorants are usually hummable.]

**NASAL – NONNASAL** — Nasal sounds are produced with a lowered velum which allows the air to escape through the nose; nonnasal sounds are produced with a raised velum so that the air from the lungs can escape only through the mouth.

**CONTINUANT – NONCONTINUANT (STOP)** — In the production of continuant sounds, the primary constriction in the vocal tract is not narrowed to the point where the air flow past the constriction is blocked; in stops the air flow through the mouth is effectively blocked.

**SIBILANT – NONSIBILANT** — Sibilant sounds are produced by forcing the air through a narrow opening produced by a groove in the midline of the tongue. Typically, sibilant sounds have a hissing quality; non–sibilant sounds do not have this quality.

**CORONAL – NONCORONAL** — Coronal sounds are produced with the blade of the tongue (the portion immediately behind the tip) raised from its neutral position; noncoronal sounds are produced with some other articulator than the blade of the tongue.

**ANTERIOR – NONANTERIOR** — Anterior sounds are produced with an obstruction that is located in front of the palato–alveolar region of the mouth; nonanterior sounds are produced without such an obstruction.

**VOICED – NONVOICED (VOICELESS)** — Voiced sounds are produced with the vocal cords vibrating; voiceless sounds are produced without such vibration.
<table>
<thead>
<tr>
<th>FEATURES</th>
<th>STOPS</th>
<th>NASALS</th>
<th>FRICATIVES</th>
<th>AFF*</th>
<th>LIQUIDS</th>
<th>GLIDES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>p</td>
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</table>

| SONORANT    | –     | –     | –     | –     | –     | +     |
| CONSONANTAL | +     | +     | +     | +     | +     | +     |
| VOCALIC     | –     | –     | –     | –     | –     | +     |
| CONTINUANT  | –     | –     | –     | –     | –     | +     |
| NASAL       | –     | –     | –     | –     | –     | –     |
| SIBILANT    | –     | –     | –     | –     | –     | +     |
| ANTERIOR    | +     | +     | +     | –     | –     | +     |
| CORONAL     | –     | –     | +     | –     | –     | –     |
| HIGH        | –     | –     | –     | +     | –     | +     |
| LOW         | –     | –     | –     | –     | +     | –     |
| BACK        | –     | –     | +     | +     | –     | –     |
| ROUND       | –     | –     | –     | –     | –     | +     |
| VOICED      | –     | +     | +     | +     | –     | +     |

*AFFRICATES
2.1.4 SUPRASEGMENTALS

There are, of course, many more sounds in the world’s languages than the ones that have been described above. In addition, human speech is characterized by several SUPRASEGMENTAL features, that is, vocal modification executed along with the pronunciation of vowels and consonants. Two of these suprasegmental features are PITCH, i.e., the relative tone at which individual sound segments or groups of segments are produced, and STRESS, i.e., the relative emphasis (or accent) given to individual sound segments or groups of segments. Features like pitch and stress are as important in speech as vowels and consonants. Often, they serve to distinguish words from each other. For example, permit must be pronounced with heavy stress on the first syllable [p̩ərmɪt] if it is used as a noun, but with heavy stress on the second syllable [p̩ərmɪt] if it is used as a verb. Notice that this variation of stress is an example of how the sound system of a language is directly related to the classes of forms in a language. It is impossible to describe this variation without reference to whether permit is used as a noun or as a verb. There are many similar cases in English, e.g., contract, pervert, present, and so on. Consider also pairs of sentences like those in (1).

(1)  a. Look at the black bird.
    b. Look at the blackbird.

One cannot describe the stress given to sequences like black+bird, unless one considers whether the sequence is used as a compound noun or as an adjective–noun construction. Examples such as these attest to the interrelationship of sound and form in the grammar of a language.

2.2 PHONOLOGY

With a complete phonetic system for the identification and classification of speech sounds available, phonologists can begin their work. Essentially, their task is to discover the ways in which the sounds of language are systematized. This includes finding out (i) which sounds, out of all the sounds a speaker of some language utters, are the linguistically significant sounds for that language, and (ii) which rules govern the organization and distribution of these sounds with respect to each other.

In analyzing English, for example, phonologists observe that all English speakers pronounce p in several different ways. In one way, the sound [pʰ] is followed by a perceptible puff of air, called ASPIRATION; this occurs in the articulation of a word like pin. In a word like spin, on the other hand, the p is not aspirated. We will use the symbol “ʰ” for aspiration: the aspirated, voiceless, bilabial stop in English is [pʰ], and the unaspirated, voiceless, bilabial stop is [p].

In examining English, phonologists also observe that there are no pairs of words which are distinguished by aspiration, in the way that there are many pairs which are distinguished by other phonetic features, such as [–VOICED] ([pʰ]) and [+VOICED] ([b]), e.g., plank and blank, tap and tab, rapid and rabid, and so on. Lastly, they observe that [p] occurs only after the sound [s] and that
[\text{p}^h] \text{ occurs everywhere else. Thus, in } \text{spot}, \text{ spin}, \text{ spoke}, \text{ and Spain, the } p \text{ is unaspirated, but in } \text{pot, pin, poke, and pain, the } p \text{ is aspirated. (The difference can be perceived if a tissue is held in front of the mouth during pronunciation.)}

These observations are important because they reveal that the distinction between [p] and [\text{p}^h], i.e., unaspirated versus aspirated, unlike the distinction between [\text{p}^h] and [b], i.e., voiceless versus voiced, is not a significant distinction in the phonology of English. Thus, while it is possible to predict when [p], as opposed to [\text{p}^h], will occur in English words, it is not possible to predict when [\text{p}^h], as opposed to [b], will occur. This distinction is crucial in phonological analysis.

Phonologists often call the distinctive classes of sounds in a language the \textbf{PHONEMES} of that language, and refer to the positional variants of phonetically similar sounds as the \textbf{ALLOPHONES} of a particular phoneme. To distinguish phonemes from allophones, the former are placed in slanted lines, e.g., /p/, and the latter retain their phonetic symbolization, e.g., [p] and [\text{p}^h]. The relationship between a phoneme and its allophonic variants is expressed in the form of a rule included in the grammar of a language. For example, the relationship between /p/, [p], and [\text{p}^h] in English is expressed in two rules as follows:

\begin{enumerate}
\item The phoneme /p/ is realized phonetically as its allophone [p] when it occurs in the environment after the [s], e.g., in the word \textit{spot}.
\item The phoneme /p/ is realized phonetically as its allophone [\text{p}^h] in all other environments, e.g., in the word \textit{pot}.
\end{enumerate}

It is important to realize that sounds which are phonemic, i.e., distinctive, in one language may be allophonic, i.e., non–distinctive, in another language. For example, while [\text{p}^h] and [p] are allophones of the same phoneme /p/ in English, they are two different phonemes in Chinese. To put it differently, while [\text{p}^h] and [p] do not distinguish pairs of words in English, they do distinguish pairs of words in Chinese. The Chinese word \textit{pa}, if pronounced with a [\text{p}^h], means ‘eight,’ and, if pronounced with a [p], means ‘white.’ It is very difficult for English speakers to master this distinction when they attempt to learn Chinese; very often, they confuse the two sounds. Conversely, speakers of many oriental languages have great difficulty in distinguishing the phonemes /l/ and /r/ in English, because these two sounds are not phonemic in their native language. Without considerable practice, a native speaker of Japanese, for example, might say \textit{rorripop} when he means \textit{lollipop}. When English speakers hear \textit{rorripop}, they find it hard to believe that the Japanese speaker can’t easily hear the difference between what he’s said and \textit{lollipop}. Similarly, a Chinese speaker will find it hard to believe that an American cannot easily distinguish between the distinct sounds [\text{p}^h] and [p].

Continuing with their analysis of English, phonologists observe that the other voiceless stop phonemes in English, namely, /t/ and /k/, show the same allophonic variations as /p/. Thus, in \textit{stop, stub, skin, school}, the t and k sounds are unaspirated, but in \textit{top, tub, kin, and cool}, they are aspirated. This is not unexpected, since /p/, /t/, and /k/ form a \textbf{NATURAL CLASS} of sounds, which is a class that shares the same set of distinctive features. In this case, the three sounds form the natural class
of [+CONSONANT, –CONTINUANT, –NASAL, –VOICED]. Furthermore, the same natural class has another allophonic variation. In final position or at the end of a syllable, they become unreleased. Notice that the final sounds in cap, pat, and tack are not fully exploded in the way the initial sounds of the same words are; similarly, the p sound at the end of the first syllable in captain and the k sound at the end of the second syllable in refracted are also not fully exploded. We will use the symbol "/" to indicate lack of release. For example, we have [kæ̃p] (cap) and [kæ̃p/θw] (captive). The environment in which "/" occurs is predictable by rule: voiceless stops are unreleased in final position of a syllable or word. Since the feature RELEASE is predictable in English, it is not distinctive.

In Chapter One, we discussed the classification of several distinctive features for English, such as [+NASAL], [+VOICED], [+ANTERIOR], and [+CORONAL]. We now have two nondistinctive features in English: [+ ASPIRATION] and [+RELEASE]. Summarizing, the following forms exist in the language:

(3) **DISTINCTIVE FEATURES.**

a.  [± VOICED]

1.  [–VOICED]  [p], [t], [k]
2.  [+VOICED]  [b], [d], [g]

b.  [± ANTERIOR]

1.  [–ANTERIOR]  [k], [g]
2.  [+ANTERIOR]  [p], [b], [t], [d]

c.  [± CORONAL]

1.  [–CORONAL]  [p], [b], [k], [g]
2.  [+CORONAL]  [t], [d]

(4) **NONDISTINCTIVE FEATURES.**

a.  [± ASPIRATED]

1.  [–ASPIRATED]  little breathiness
   
   (i)  [p]  spade  [sped]
   (ii)  [t]  steam  [stim]
   (iii)  [k]  school  [skul]

2.  [+ASPIRATED]  considerable breathiness
Phonologists discover the distinctive features of a language by looking for a pair of words distinguished by one and only one sound. Such a pair is called a **MINIMAL PAIR**. If two sounds occur in a minimal pair, then they occur in identical environments. This means that the two sounds are distinctive and distinguish words. (6) contains examples of minimal pairs; (6), does not.

**MINIMAL PAIRS** Good Examples (**SPELLING IRRELEVANT**):

a. mace/base [mes]/[bes]
b. ether/either [iʃCr]/[iðCr]
c. known/sewn/shone [non]/[son]/[ʃon]
d. phlegm/Clem [flɛm]/[kɛlɛn]
e. who’d/hood [hud]/[hʌd]
f. bird/heard [bCr]/[hCr]

Not Examples (**SPELLING IRRELEVANT**):

a. buff/bluff [bʌf]/[bʌf]
b. choose/loose [ʃuːz]/[lʊs]
c. though/tough [ðo]/[tʌf]
d. chef/chief [ʃɛf]/[ʃɛf]
e. great/heart [ɡret]/[hɑrt]
f. beard/heard [bɛrd]/[hɛrd]

As we will have occasion to notice many times in this book, an important objective of linguistics is the construction of formal grammars. A formal grammar is simply one that is perfectly explicit
and testable. Precision is essential in linguistics, as it is in all other sciences. Without precision, hypothetical principles and rules cannot be evaluated and tested with confidence. If hypotheses cannot be tested, then substantive conclusions cannot be drawn. Rules such as those in (2) are too informally written to satisfy scientific criteria. Therefore, linguists usually replace them with a SLASH–DASH notation as follows:

**FORMAL PHONOLOGICAL RULES:**

(7) a. \([+\text{STOP}, –\text{VOICED}] \xi [–\text{ASPIRATED}] / [s] \)  
a voiceless stop is unaspirated after [s]

b. \([+\text{STOP}, –\text{VOICED}] \xi [–\text{RELEASED}] / ___ \)  
a voiceless stop is unreleased before a syllable boundary or a word boundary

Each symbol in this notation has a precise meaning. As a result the rules are explicit and testable. The slash–dash notation, which will be used throughout this text, observes the following conventions:

**THE SLASH–DASH NOTATION:**

(8) a. \(\xi\) means ‘is’

b. (...) items in parentheses are optional
c. {...} items in curly brackets or braces are alternatives
d. / means ‘in the environment of’
e. ___ means ‘before’ or ‘after’ or ‘between’
f. / ___ x means ‘before x’
g. / x ___ means ‘after x’
h. / x ___ y means ‘between x and y’
i. # means ‘word boundary’
j. ___# means ‘after a word boundary,’ that is, ‘at beginning of word’
k. ___ # means ‘before a word boundary,’ that is, ‘at end of word’
l. + means ‘syllable boundary’ or ‘morpheme boundary’
m. +___ means ‘after a syllable or morpheme boundary’
n. ___+ means ‘before a syllable or morpheme boundary’

Summarizing the theoretical apparatus developed so far, we say that phonological representations occur in pairs: a phonemic or abstract representation coupled with a phonetic or real representation. The two representations are related by phonological rules.

The necessity for both levels of representation can be illustrated further in the following way (see Figure Seven below). Suppose one English speaker utters the sentence If you hit me, I’ll hit you. What the speaker actually says in the second part of this sentence is [ayl h w]. The verb, therefore, appears to be hitch [h w]. But, although the listener has heard [h w], what he understands is /h w/.
(hit). The real or superficial or phonetic representation, the one actually spoken and heard, is \([h\,w]\); the abstract or underlying or phonemic representation, the one intended and understood, is /h\,w/. The relationship between the two is accounted for by phonological rules like those in (7), specifically, (9a) and (9b).

\[(9) \begin{align*}
\text{a. } [t] & \quad \text{Æ} \quad [\mathcal{Y}] \quad / \quad [y] \\
\text{b. } [y] & \quad \text{Æ} \quad \emptyset \quad / \quad [\mathcal{Y}] \quad \\
\end{align*}\]

(9a) changes a [t] to a [\mathcal{Y}] before [y]; (9b) deletes a [y] after [\mathcal{Y}]. The symbol "\(\emptyset\)" means ‘zero’; so (9b) says that a [y] becomes zero (is deleted) after [\mathcal{Y}]. These rules represent the change of [t] to [\mathcal{Y}]. The derivation from underlying form to surface form proceeds as follows:

\[(10) \begin{align*}
\text{UNDERLYING FORM: } & /h\,w\,y\,u/ \\
\text{APPLICATION OF RULE (9a): } & h\mathcal{W}y\,u \\
\text{APPLICATION OF RULE (9b): } & h\mathcal{W}u \\
\text{SUPERFICIAL FORM: } & [h\mathcal{W}u] \\
\end{align*}\]

This derivation is intended to represent the native speaker’s knowledge (competence) of the intended meaning of what is actually uttered, namely, [h\mathcal{W}u].

To an introductory linguistics student, a derivation like (10) often appears to be the result of hocus–pocus. This is not the case. The derivation proceeds from facts: in the example cited, there is a discrepancy between what is uttered and heard ([h\mathcal{W}u]), on the one hand, and what is intended and understood (/h\,w/), on the other. Further, every native speaker of English knows this unconsciously; it is part of his linguistic competence. If this were not true, the person hearing [h\mathcal{W}u] in the context given, would not understand the intended meaning. These facts are givens; there is nothing that a linguist can do but attempt to describe and explain them. It is not the job of linguistics to alter the way people communicate (a hopeless task, incidentally). The postulation of an abstract underlying form, related by rule to a real superficial form, is merely an effort to describe observed phenomena. Again, linguistic theory proceeds in the appropriately scientific manner.
### Distinctive Features vs. Non-Distinctive Features

<table>
<thead>
<tr>
<th>Distinctive Features</th>
<th>Non-Distinctive Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>[± voiced]</td>
<td>[± aspirated]</td>
</tr>
<tr>
<td>[± anterior]</td>
<td>[± released]</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Not Predictable by Rule</th>
<th>Predictable by Rule</th>
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<tbody>
<tr>
<td>Nonredundant</td>
<td>Redundant</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Found in Minimal Pairs</th>
<th>Not Found in Minimal Pairs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Found in Overlapping Distribution (in the same environments)</td>
<td>Found in Complementary Distribution (not in the same environments)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Slanted Line Notation</th>
<th>Square Bracket Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>/spat/ spot</td>
<td>[spat/] spot</td>
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<table>
<thead>
<tr>
<th>Underlying (Deep)</th>
<th>Superficial (Surface)</th>
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<tbody>
<tr>
<td>Abstract</td>
<td>Real</td>
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</table>

Examples:

- Will he hit me? /wili hwi mi/ [wili hwi mi]
- Will he hit you? /wili hwi yu/ [wili hwi yu]
- Willie hit you? /wili hwi yu/ [wili hwi yu]
- Will he hitch you up? /wili hwi yu 3p/ [wili hwi yu 3p/]
- Willie hitched you up? /wili hwi yu 3p/ [wili hwi yu 3p/]

### 2.3 Phonotactics

Further investigation of English phonology reveals that there are general restrictions on the sequences of sounds that are permissible in the language. There are **Accidental Gaps**,
sequences of sounds that just don’t happen to occur, and, **NONACCIDENTAL GAPS**, sequences of sounds that are not possible. The permissible sequences are specified in the **PHONOTACTIC RULES** of the language, that is the rules concerned with the sequential arrangements of sounds in larger units. Consider the following:

<table>
<thead>
<tr>
<th></th>
<th>ACCIDENTAL GAP (possible words):</th>
<th>NONACCIDENTAL GAP (impossible words):</th>
</tr>
</thead>
<tbody>
<tr>
<td>(11)</td>
<td>[bl\text{\textit{w}}], [st\text{\textae}no], [sprim]</td>
<td>[ft\text{\textit{w}}], [zd\text{\textae}no], [spnim]</td>
</tr>
</tbody>
</table>

In analyzing the **PHONOTACTICS** of English, phonologists would observe that an English word cannot end with two nasal consonants. We see this in the root /kal\text{\text acute}m/ which loses the second nasal in the word *column* [kal\text{\text acute}m], but retains it before the suffix –ist in the word *columnist* [kal\text{\text acute}m\textit{ist}]. Compare also *autumn* and *autumnal*. The loss of the second nasal at the end of a word is accounted for by the following phonotactic rule:

(13) \([+\text{NASAL}] \Xi \emptyset / [+\text{NASAL}]___#\)

The presence of rules like (13) is what makes some words retaining their foreign spelling look so strange as compared to their pronunciation, e.g., *mnemonic*, *pneumonia*, and *pterodactyl*, which come to English from Ancient Greek.

### 2.4 MORPHOLOGY

As one might expect, the study of the sound system of a language cannot be carried out in complete isolation from the other components of grammar. The phonological rules, in particular, very often involve reference to **MORPHEMES**, which are the minimal units of meaning in a language. Consider the following (ignoring details involving aspiration and release):

(14) **MORPHEME**: a minimum unit of distinctive meaning.

<p>| | |</p>
<table>
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<tbody>
<tr>
<td>a.</td>
<td>[ri\text{\textacute}d\text{\textit{c}}r] ‘reader’; 2 syllables; 2 morphemes:</td>
</tr>
<tr>
<td></td>
<td>/\text{\textacute}rd/ ‘to interpret print’</td>
</tr>
<tr>
<td></td>
<td>/\text{\textacute}r/ ‘agent’</td>
</tr>
<tr>
<td>b.</td>
<td>[kri\text{\textacute}yet\text{\textacute}t\text{\textacute}c\text{\textacute}r] ‘creator’; 3 syllables; 2 morphemes.</td>
</tr>
<tr>
<td></td>
<td>/kri\text{\textacute}yet/ ‘to bring into existence’</td>
</tr>
<tr>
<td></td>
<td>/\text{\textacute}r/ ‘agent’</td>
</tr>
<tr>
<td>c.</td>
<td>[dal\text{\textacute}c\text{\textacute}r] ‘dollar’; 2 syllables; 1 morpheme.</td>
</tr>
<tr>
<td>d.</td>
<td>[\text{\textacute}nt\text{\textacute}l\text{\textacute}c\text{\textacute}r] ‘antler’; 2 syllables; 1 morpheme</td>
</tr>
</tbody>
</table>

As the examples in (14) show, morphemes are not necessarily equivalent to either words or syllables. Further, a particular sequence of sounds can be a morpheme in one word and not another: notice [\text{\textacute}Cr] in *reader* is a morpheme, whereas the [\text{\textacute}Cr] in *antler* is not. Similarly [\text{\textacute}rd] is a morpheme in *reader* [rid\text{\textacute}d\text{\textit{c}}r], but not in *breeder* [brid\text{\textacute}d\text{\textit{c}}r].
Morphemes have different phonetic variants in different contexts just as phonemes do. Paralleling the **PHONEME/ALLOPHONE** relation, we have the **MORPHEME/ALLOMORPH** relation. An **ALLOMORPH** is a conditioned *phonetic* variation of a morpheme. Consider the following:

(15) **ALLOMORPH**: a conditioned *phonetic* variation of a morpheme:

a. Negative Prefix:
   - [ Manson]: *impossible, imbalance*
   - [ Mun]: *intangible, indiscrete*
   - [ Mõ]: *incorrigible, ingratitude*

b. The indefinite article:
   - [ 3/]: *a book, a use, a hotel*
   - [ an]: *an owl, an honor*

For the grammarian, one point of particular interest in morphological analysis concerns the nature of the variations which specific morphemes show in their phonetic shape. Occasionally, this variation is peculiar and reflects the idiosyncratic speech habits of individual speakers. For example, some English speakers pronounce *abdomen* with heavy stress on the first syllable, while others pronounce it with heavy stress on the second syllable. In such cases as this, the rival forms are said to be in **FREE VARIATION**.

More commonly, a variation in the pronunciation of a morpheme is predictable and reflects specific rules in the grammar of a particular language, sometimes called **MORPHOPHONEMIC** or **MORPHOPHONOLOGICAL RULES**. For example, the plural morpheme in English nouns is variously pronounced [Cz] as in *busses, [s] as in *bucks, and [z] as in *bugs.*

The occurrence of each of these allomorphic variants is predictable in terms of the phonetic environment in which the plural morpheme occurs. If the morpheme occurs after [s], [z], [õ], or [ $]$, it is realized phonetically as [Cz], e.g., *dresses, sizes, ashes.* Otherwise, if it occurs after a voiceless consonant, it is realized phonetically as [s], e.g., *tanks, pipes, slots;* if it occurs after a voiced consonant or after a vowel, it is realized phonetically as [z], e.g., *bulls, trees, eggs.* Utilizing the theory of distinctive features, we can formally represent these rules as follows (where **PL** means ‘plural’):

(16) a. **PL** $\in$ [Cz] / [+SIBILANT] ___
b. **PL** $\in$ [s] / [–VOICED] ___
c. **PL** $\in$ [z] / [+VOICED] ___

These same variations are also found in the morpheme which indicates the third person singular present tense of verbs, e.g., [Cz] as in *blesses and pleases,* [s] as in *attempts and pollutes,* and [z] as in *confides and specifies.* They also appear in contractions (*he’s for he is*) and possessives, e.g., [Cz] as in *Bess’s and Josh’s,* [s] as in *Pat’s and Skip’s,* and [z] as in *Budd’s and Don’s.*
2.5 THE BIOLOGICAL BASIS OF PHONOLOGY

In Chapter One, we discussed two fundamental problems for linguistic theory, the grammatical characterization problem and the grammatical realization problem. We pointed out that the ultimate objective of linguistic research is to uncover the specifications of UG, the collection of features and principles which are potential characteristics of any human language. This goal is achieved by relating the facts of grammatical characterization to the facts of grammatical realization.

The rules we have considered so far are descriptively adequate (see Chapter One) as far as the examples cited are concerned; however, they are not general enough. We can attain a higher level of descriptive adequacy.

Consider, first, rule (9a) and notice that both members of the pair \[t\]–\[f\] are voiceless. If our theory is correct, we expect the other members of this natural class to behave similarly, that is, we expect the grammar to contain (17).

(17) \([d]\) \[\epsilon\] \[g\] / ___ \[y\]

In fact, English does have (17), as (18) shows.

(18) a. If you hide me, I’ll hide you.
    b. If you hide me, /ay w\(\text{\textsc{w}}\)hayd yu/
    c. If you hide me, [ayl hay \textsc{\#i}].

Since the sounds involved form a natural class, we can collapse (9a) and (17) to (19), thereby attaining a higher level of descriptive adequacy.

(19) \[\text{[–SIBILANT, +ANTERIOR]} \epsilon \text{[+SIBILANT, –ANTERIOR]} / ___ [y]\]

This rule appears to be correct; however, we have gone too far. The feature constellation \[\text{[–SIBILANT, +ANTERIOR]}\] includes many consonants other than \[t\] and \[d\]; specifically, it includes \[p\], \[b\], \[m\], \[n\], \[\text{[\&]}\], \[\delta\], \[l\], \[r\], and \[y\]. None of these sounds becomes an affricate before \[y\]; therefore, we amend (19) to (20):

(20) \[
\begin{array}{c}
\text{[–SIBILANT} \\
\text{+ANTERIOR} \\
\text{–SONORANT} \\
\text{–NASAL} \\
\text{–CONTINUANT} \\
\text{+CORONAL} \end{array}
\rightarrow
\begin{array}{c}
\text{[+SIBILANT} \\
\text{–ANTERIOR} \\
\text{–SONORANT} \\
\text{–NASAL} \\
\text{–CONTINUANT} \\
\text{+CORONAL} \end{array}
/ ___ [y]
\]
Notice that (20) involves a change of two distinctive features; the other features remain unchanged. The result is that an alveolar stop ([t] or [d]) followed by the anterior glide ([y]) becomes an affricate ([tʃ] or [dʒ]). It is important to realize that one letter or sound does not turn into another. The letter t and the sound [t] are merely abbreviations for constellations of distinctive features derived from characteristics of the human vocal apparatus. It is these features that change in the operation of phonological rules. In (20), two of the features in the feature cluster change value; the others remain unchanged.

Notice also that our concern for formalism, that is, precision, now pays off, because only now can we ask the really important questions: Why does the grammar of a human language contain a rule like (20)? Does a child born in an English speaking environment have to learn this rule specifically, as a peculiar fact about English, in the way that he must learn that the past tense of go is went? The answer to these questions involves a dynamic that exists between the structure of the human vocal apparatus and the general phonology of English. This dynamic is influenced by a number of factors.

First, notice that rapid articulation of the sound sequence [tyu] sounds very much like [tʃu], and the articulation of [dyu] sounds very much like [dʒu]. The reason for this is due to the position the tongue must assume during the articulation of the sequences [tyu] and [dyu]. Thus, it would be quite natural for speakers to merge [t]/[d] and [yu] across a word boundary, substituting [tʃu] for [tyu] and [dʒu] for [dyu] in rapid articulation.

Second, this substitution would be particularly likely under two conditions: (i) if the phonology of the language includes the sounds [tʃ] and [dʒ] as phonemes, and (ii) if the language does not have a phonological distinction between [ty] and [tʃ], or [dy] and [dʒ]. These two conditions both exist in English. The sounds [tʃ] and [dʒ] are common in all dialects (chew, church, chat, chair, cheer; Jew, judge, jet, jam, jeer, etc.). Furthermore, most dialects of English do not have phonetic sequences of [t] or [d] followed by [y] unless there is a pause in pronunciation. The usual pronunciation of tune, for example, is [tun], not [tyun].

For these reasons, in rapid speech, it is natural for an English speaker, knowing the overall phonology of English, to apply (20). What this means is that, in the overall phonology of any given language, some phonological rules follow naturally given other factors. The suggestion, therefore, is that an English speaking child does not have to learn (20) specifically as a peculiar, isolated fact about English.

This analysis clearly indicates that some phonological processes are at least partially predictable. In other words, a child learning a language is not faced with the task of acquiring a set of rules that are isolated, idiosyncratic, and arbitrary. Apparently, language acquisition is possible precisely because a significant portion of the grammar of all natural languages is a direct reflection of the nature of the apparatus used to produce them, that is, of the articulatory and auditory organs and the brain.

This issue is important enough to require careful scrutiny. Therefore, let us consider a more extended example and return to the rules for forming the plural given in (16). Notice first that there
is an alternation in the allomorph which signal past tense in English that is similar to the rules in (16). Consider the following (where PST means 'past tense'):

(21) a. PST \text{EI} [\text{Cd}] / \{[t], [d]\} ___
b. PST \text{EI} [\text{t}] / \{\text{–VOICED}\} ___
c. PST \text{EI} [\text{d}] / \{\text{+VOICED}\} ___

Rule (21a) correctly specifies past tense forms like *relented* ([ril\text{ent}cd]) and *applauded* ([clawdcd]); (21b), *disliked* ([d\text{laykt}]) and *laughed* ([læft]); (21c), *nagged* ([nægd]), *riled* ([rayld]), and *relayed* ([riled]). Notice that all past tenses of regular verbs in English are spelled either –\text{ed} or –\text{d}; but, this is not relevant to their pronunciation. Compare *riled* ([rayld]) and *relayed* ([riled]). As we have seen, the rules of language are based on speech, not writing.

The important question now is, Can the characterizations in (16) and (21) be related to universal grammar? The answer is, \textit{Yes}. The following sections specify that relationship.

\textbf{2.5.1 FIRST SET OF OBSERVATIONS}

Notice that (16) and (21) are very similar. Both sets of rules begin with a rule that deals with the allomorphic variant that occurs when the morpheme and the stem to which it is suffixed are \textit{HOMORGANIC}, that is, share the same or very similar set of distinctive features.

(16a) deals with the suffixation of a [+SIBILANT, +CORONAL] morpheme to a word which ends in a sound that is [+SIBILANT, +CORONAL]. (21a) deals with the suffixation of an alveolar stop ([–CONTINUANT, –NASAL, +ANTERIOR, +CORONAL]) to a word which ends in an alveolar stop. In both sets of rules, a separate syllable is created with the neutral vowel [\text{C}] to distinguish the morpheme from the stem to which it is being attached. Furthermore, if this were not done, some sequences violating English (if not, universal) phonotactics would result, e.g., *[æss] and *[clawdd].

In the remaining rules in both sets, a very common phonological process occurs. This process, called \textit{ASSIMILATION}, involves making adjacent sound segments similar in distinctive feature composition. In (16) and (21) the assimilation involves the feature [±VOICED]. Assimilation in natural languages is so common that it is considered the \textit{UNMARKED} or expected case. Lack of assimilation in suffixation is the \textit{MARKED} or atypical case.

Given these remarks, we specify the morphemes in question as (22), and we replace (16) and (21) with the more general principles in (23).

(22) a. The PST morpheme in English is the suffix [d].
b. The PL morpheme in English is the suffix [z].
(23)  a. If a suffix and the final segment to which it is attached are homorganic, insert the neutral vowel [ɛ] between the stem and the suffix.
    b. In all other cases, assimilate the suffix and the final segment in voicing.

In order to express principles like (23) formally, we must have a way to represent a variable feature value. This is done using Greek letters in the spot in front of a feature where a “+” or “–” usually occurs. For example, we express voicing assimilation (23b) as follows:

(24)  [+CONSONANT]  ξ  ["VOICED]  /  ["VOICED]  +  ___

This rule says that a consonant beginning a suffix gets a value of voicing (either “+” or “–”) that is the same as the final segment before the morpheme boundary. Notice that “+” has two meanings: before a feature as in [+VOICED], it indicates a positive value for the feature; by itself in a rule like (24), it indicates a morpheme boundary.

Sometime, several features assimilate at the same time. In this case, more than one Greek letter is necessary to separate the assimilating features from each other. For example, consider again the negative prefix given in (15a), repeated here:

(25)  a. [ʍ]: impossible, imbalance
    b. [ʍ]: intangible, indiscrete
    c. [ẽ]: incorrigible, ingratitude

In this set of data, there is an assimilation of the features ANTERIOR and CORONAL to those of segment beginning the word. This means that the value (“+” or “–”) of the features ANTERIOR and CORONAL of the consonant beginning the word must be the same as the prefix. We can express this as follows:

(26)  [+NASAL]  ξ  ["ANTERIOR, $CORONAL]  /  ___+  ["ANTERIOR, $CORONAL]

In this rule, we must keep the assimilating values for ANTERIOR separate from those of CORONAL; hence, two Greek letters are needed. The value of “$” and “$” must be the same in both places where each occurs in the rule. In short, (26) abbreviates the following four rules:

(27)  [+NASAL]  ξ  [+ANTERIOR, –CORONAL]  /  ___+  [+ANTERIOR, –CORONAL]
(28)  [+NASAL]  ξ  [–ANTERIOR, +CORONAL]  /  ___+  [–ANTERIOR, +CORONAL]
(29)  [+NASAL]  ξ  [+ANTERIOR, +CORONAL]  /  ___+  [+ANTERIOR, +CORONAL]
(30)  [+NASAL]  ξ  [–ANTERIOR, –CORONAL]  /  ___+  [–ANTERIOR, –CORONAL]

Clearly, a rule like (26) will be needed to express the homorganicity in (23a). For example, if we wish to express the insertion of [ɔ] before the past tense morpheme [d], then (31) is needed.
Similarly, (32) is needed for the insertion of [ɛ] before the plural morpheme [z]:

\[(32) \quad \emptyset \rightarrow [ɛ] / \quad \begin{array}{c}
\text{[+SIBILANT]} \\
\text{[+ANTERIOR]} \\
\text{[+CORONAL]}
\end{array} + \begin{array}{c}
\text{[+SIBILANT]} \\
\text{[+ANTERIOR]} \\
\text{[+CORONAL]} \\
\text{[+VOICED]}
\end{array}\]

Using the "–notation, we can collapse these to (33).

\[(33) \quad \emptyset \rightarrow [ɛ] / \quad \begin{array}{c}
\text{[αCONTINUANT]} \\
\text{[βNASAL]} \\
\text{[γSIBILANT]} \\
\text{[+ANTERIOR]} \\
\text{[+CORONAL]}
\end{array} + \begin{array}{c}
\text{[αCONTINUANT]} \\
\text{[βNASAL]} \\
\text{[γSIBILANT]} \\
\text{[+ANTERIOR]} \\
\text{[+CORONAL]} \\
\text{[+VOICED]}
\end{array}\]

### 2.5.2 SECOND SET OF OBSERVATIONS

We have now correctly identified the morphemes for the plural and for the past tense (cf. (22)), repeated here as (34).

\[
(34) \quad \begin{align*}
\text{a.} \quad & \text{The PST morpheme in English is the suffix [d].} \\
\text{b.} \quad & \text{The PL morpheme in English is the suffix [z].}
\end{align*}
\]

We have also formally expressed the distribution of the allomorph in (23a)/(33) and (23b)/(24), repeated here together as (35).

\[
(35) \quad \begin{align*}
\text{a.} \quad & \text{If a suffix and the final segment to which it is attached are homorganic, insert the neutral vowel [ɛ] between the stem and the suffix.}
\end{align*}
\]
b. In all other cases, assimilate the suffix and the final segment in voicing.

\[
\emptyset \rightarrow \text{[e]} + \begin{array}{c}
\text{[\text{CONINUANT}]}\\
\text{[\text{NASAL}]}\\
\text{[\text{SIBILANT}]}\\
\text{[\text{ANTERIOR}]}\\
\text{[\text{CORONAL}]}
\end{array} + \begin{array}{c}
\text{[\text{CONINUANT}]}\\
\text{[\text{NASAL}]}\\
\text{[\text{SIBILANT}]}\\
\text{[\text{ANTERIOR}]}\\
\text{[\text{CORONAL}]}
\end{array}
\]

How does this characterization in (34) and (35) relate to what speakers know? It is clear that native speakers of English know what the two morphemes are and how they are distributed. English speakers do not have to hear the plural or every noun and the past tense of every verb in order to produce the correct forms. In fact, if speakers are given nonsense words and asked to make them plural or past tense, they produce forms which obey (34) and (35). Moreover, speakers make up words in the correct number and tense all the time. For example, on a recent TV commentary of the US Figure Skating Championships, Peggy Fleming said, *She two–footed that landing.* Members of the television audience did not wince at the new verb *two–foot*; everyone routinely understood it. Further, the correct allomorph was uttered and understood, even though the expression must have been a neologism to most who heard it. Examples like this occur very frequently.

Young children also produce forms that they never could have heard: past tenses like [god] ‘goed’ and [Trold] ‘thowed’; plurals like [mænz] ‘mans’ and [fUts] ‘foots.’ These overgeneralizations give clear evidence that the substance of (34) and (35) is unconsciously known to native speakers of English from a very early age.

Do native speakers (unconsciously) know (34) and (35) in the form given? The answer is not clear. While the substance of (34) and (35) can be expressed in many different ways, the characterization given is the most generalized. Science usually tries to account for natural phenomena with the most generalized descriptions possible. But there is no way to determine whether or not people do the same when they learn their native language. In fact, it may be the case that the rules of language are redundantly specified. Future psycholinguistic and neurolinguistic investigations may help to settle this issue.

### 2.5.3 THIRD SET OF OBSERVATIONS

Summarizing, we can say that (34) and (35) reach a very high level of descriptive adequacy. They adequately account for all the known cases, and do so in a highly generalized way. Further, the substance of (34) and (35) is unconsciously known to every native speaker.
Consider next the question whether children have to learn both (34) and (35). It seems clear that children are not born with unconscious knowledge of (34), because (34) contains facts peculiar to English. There is no reason in principle why, say, the meanings of the morphemes couldn’t be reversed in some other language. The rule (35a) is also peculiar to English; however, its effect is to differentiate morphemes, so we would expect other languages to have rules of similar design.

The status of (35b) is another matter. The rule (35b) is a good candidate for UG status, that is, it is possible that (35b) is part of man’s genetic makeup. This would mean that it follows directly and naturally from the nature of the human language apparatus, and that a particular form in a particular language violating (35b) would be MARKED in the sense described above. Human languages generally have a voicing assimilation rule, apparently because it is easier for a human vocal apparatus to articulate adjacent sounds with the same voicing than with opposite voicing. This is particularly true at the end of a word. As a result, we say that children do not have to learn (35b); it is part of their genetic endowment; it is the UNMARKED case.

While this discussion is far from conclusive, it does show that all the facts in the characterization of a language are not equal. Some facts may be highly marked, and, therefore, take children a long time to master. Other facts may reflect inner characteristics of man, and, therefore, be part of the innate knowledge that children bring to native language acquisition. Because children have a human language apparatus, some features and principles are more likely to occur in a human language than others.

2.6 THE PHONOLOGICAL AND LEXICAL COMPONENTS OF A GRAMMAR

The PHONOLOGICAL COMPONENT of a grammar consists of the list of phonological rules. These are rules like (24), (26), and (33), which relate underlying forms to superficial forms. Also included in the phonological component are phonotactic rules like (17) and phonological REDUNDANCY RULES like (36).

\[(36)\]
\[\begin{align*}
\text{a. } [+\text{HIGH}] & \xi [+\text{HIGH}, –\text{LOW}] \\
\text{b. } [+\text{LOW}] & \xi [+\text{LOW}, –\text{HIGH}] 
\end{align*}\]

(36a) accounts for the fact that a segment that is [+HIGH] cannot also be [–LOW], and (36b) account for the reverse. These are redundantly specified features, that is, features that are predictable given other features.

Vowels have many redundant features. Since only vowels have TENSE, we can specify the redundancies as follows:

\[(37) \quad ["\text{TENSE}] \xi ["\text{TENSE}, +\text{VOCALIC} –\text{CONSONANTAL}, +\text{SONORANT}, –\text{NASAL}, +\text{CONTINUANT}, –\text{ANTERIOR}, –\text{CORONAL}, +\text{VOICED}, –\text{SIBILANT}]\]
Since all the features except TENSE in (37) are redundant, they are generally left out of charts of distinctive features for vowels (cf. Figure Three on Page 31).

The **LEXICAL COMPONENT (LEXICON)** of a grammar is the dictionary of morphemes and words, as well as lexical redundancy rules and rules of word formation. (38) is an example of lexical redundancy.

(38)  \([+\text{HUMAN}] \quad \Xi \quad [+\text{HUMAN}, +\text{ANIMATE}, +\text{CONCRETE}]\)

The rule (38) accounts for the fact that all HUMAN nouns are also ANIMATE and CONCRETE.

The lexicon also contains morphemes like (39).

(39)  Morphemes:

a. /tr\textsuperscript{3}/st/  trust, trusts, trusted, mistrust, mistrustful, entrust, untrustworthy, etc.

b. /red/  raid, raids, raided, raiding, raider, raiders

From these components, we can produce underlying representations like (40).

(40)  Underlying phonological representations:

a. /tr\textsuperscript{3}/st+s/

b. /tr\textsuperscript{3}/st+d/

c. /m\textsuperscript{W}tr\textsuperscript{3}/st/

d. /m\textsuperscript{W}tr\textsuperscript{3}/st+f\textsuperscript{\textcircled{1}}/  

Application of various phonological rules to (40) produces the following phonetic representations, respectively:

(41)  Phonetic representations (ignoring details involving aspiration and release):

a. [tr\textsuperscript{3}st\textsuperscript{s}]

b. [tr\textsuperscript{3}stCd]

c. [m\textsuperscript{W}t\textsuperscript{3}st]

d. [m\textsuperscript{W}t\textsuperscript{3}stf\textsuperscript{\textcircled{1}}]

To these forms, various stress rules must apply assigning the appropriate intonation contours to words. We will return to a discussion of the lexicon in subsequent chapters.

### 2.7 ENGLISH SPELLING
It is no secret that English words are not spelled phonetically. In fact, lists of spelling nightmares like the following can be found in every student’s notebook:

(42) a. rafter / laughter / slaughter
b. slay / sleigh / sleight / slight
c. ear / earn / urn / earth / hearth
d. though / thought / through
e. for / fore / four / fourteen / forty

Often, the same sound has many different spellings:

(43) a. heard / word / bird / curd / nerd
b. rays / raise / raze / weighs / phase / obeys
c. weird / feared / veered / adhered
d. birth / berth / worth / earth

Likewise, similar spellings can signify widely different sounds:

(44) a. beard [bird] / heard [hCrд]
b. comb [kom] / tomb [tum] / bomb [bam]

One frequently hears desperate cries for reform of the English spelling system. While there are many peculiarities, it is clear that a system of phonetic spelling would undermine the considerable regularity between English spelling and English morphology. For example, consider the various spellings of the reduced vowel schwa (C) in the second syllable of fallacy, remedy, family, history, industry. In these, as in other cases, the spelling derives from the spelling of the root word as comparisons reveal:

(45) a. Spelled a: fallacy/fallacious; comparable/compare; legacy/allegation
b. Spelled e: remedy/remedial; manager/managerial; competent/compete
c. Spelled i: famly/familial; presdent/preside; immigrate/migrate
d. Spelled o: history/historian; consolation/console; janitor/janitorial
e. Spelled u: industry/industrial; illustrate/illustrative

Similarly, silent letters frequently show up in related words:

(46) a. Silent n: hymn/hymnal; column/columnar, columnist; damn/damnation
b. Silent g: resign/resignation; sign/signal, designate; phlegm/phlegmatic
c. Others: muscle/muscular; bomb/bombard; soften/soft; know/acknowledge

There are also many regularities. For example, consider the vowel alterations in (47) where the silent e indicates that the preceding vowel must be tense.
Lax/Tense Vowel Alternations

a. \[\text{[w]}, \text{[ay]}\]: divinity, divine; ignition, ignite; width, wide; typical, type
b. \[\text{[æ]}, \text{[ey]}\]: profanity, profane; sanity, sane; bath, bathe; shadow, shade
c. \[\text{[e]}, \text{[iy]}\]: serenity, serene; redemption, redeem; slept, sleep; metric, meter
d. \[\text{[ɔ̃]}, \text{[aw]}\]: profundity, profound; abundant, abound; southern, south
e. \[\text{[a]}, \text{[ow]}\]: verbosity, verbose; knowledge, know; nostril, nose; phonic, phone

These vowel alternations are rule governed as are the consonant alternations in (48) and (49).

Stop/Fricative Alternations

a. \[\text{[t]/[s]}\]: democrat/democracy; president/presidency; pirate/piracy
b. \[\text{[k]/[s]}\]: electric/electricity; public/publicity; medical/medicine
c. \[\text{[s]/[ʃ]}\]: express/expression; digress/digression; race/racial; space/spatial
d. \[\text{[z]/[ʒ]}\]: revise/revision; infuse/infusion; excise/excision; confuse/confusion
e. \[\text{[t]/[ʃ]}\]: relate/relation; ignite/ignition; native/nation; president/presidential
f. \[\text{[k]/[ʃ]}\]: logic/logician; magic/magician; practical/practitioner
g. \[\text{[d]/[ʒ]}\]: persuade/persuasion; corrode/corrosion; decide/decision
h. \[\text{[d]/[s]}\]: persuade/persuasive; corrode/corrosive; divide/divisive
I. \[\text{[z]/[s]}\]: abuse (verb)/abusive; diffuse/diffusive

Stop/Affricate Alternations

a. \[\text{[d]/[ŋ]}\]: grade/gradual; residue/residual
b. \[\text{[t]/[ŋ]}\]: right/righteous; Christ/Christian; quest/question
c. \[\text{[g]/[ŋ]}\]: allegation/allege; regal/regicide; rigor/rigid; gregarious/egregious

Basically, changing English spelling to a system that is phonetic would obscure many of the regular allomorphic variations in the language. A much better approach would be to teach students something about English phonology and morphology pointing out that English spelling reveals underlying regularities. Discussion of the rules governing these alternations requires considerable technical mastery and is beyond the capabilities of elementary school children trying to cope with English spelling. However, it would certainly be both possible and helpful to point out the regularities as the words entered children’s vocabulary studies.
### 2.8 SUMMARY OF RULE FORMALISM

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>[x]</code></td>
<td>x is a PHONETIC symbol or feature</td>
</tr>
<tr>
<td><code>/x/</code></td>
<td>x is a PHONEMIC symbol or feature</td>
</tr>
<tr>
<td><code>Ø</code></td>
<td>null</td>
</tr>
<tr>
<td><code>Ξ</code></td>
<td>null</td>
</tr>
<tr>
<td><code>/</code></td>
<td>in the environment of</td>
</tr>
<tr>
<td><code>___</code></td>
<td>before, after, or between</td>
</tr>
<tr>
<td><code>/___x</code></td>
<td>before x</td>
</tr>
<tr>
<td><code>/x___</code></td>
<td>after x</td>
</tr>
<tr>
<td><code>/x___y</code></td>
<td>between x and y</td>
</tr>
<tr>
<td><code>#</code></td>
<td>word boundary</td>
</tr>
<tr>
<td><code>/#___</code></td>
<td>at beginning of word</td>
</tr>
<tr>
<td><code>/___#</code></td>
<td>at end of word</td>
</tr>
<tr>
<td><code>+</code></td>
<td>morpheme boundary</td>
</tr>
<tr>
<td><code>/+___</code></td>
<td>after a morpheme boundary</td>
</tr>
<tr>
<td><code>/___+</code></td>
<td>before a morpheme boundary</td>
</tr>
<tr>
<td><code>C</code></td>
<td>CONSONANT</td>
</tr>
<tr>
<td><code>V</code></td>
<td>VOWEL</td>
</tr>
<tr>
<td><code>(x)</code></td>
<td>x is an OPTIONAL element</td>
</tr>
<tr>
<td><code>{x, y, z}</code></td>
<td>x, y, and z are ALTERNATIVE elements</td>
</tr>
<tr>
<td><code>[x, y, z]</code></td>
<td>x, y, and z are a cluster of features</td>
</tr>
</tbody>
</table>

### 2.9 NOTES ON SYLLABLES

A word has as many syllables as it has vowels. Each vowel can be preceded and followed by any number of consonants. The superscript on the symbol “C” indicates the maximum number of consonants ($n$=any number greater than 1); the subscript indicates the minimum number ($0$=none).  

<table>
<thead>
<tr>
<th>Syllable Type</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>All one syllable words:</td>
<td># $C^n_0$ $V$ $C^n_0$ #</td>
</tr>
<tr>
<td>All two syllable words:</td>
<td># $C^n_0$ $V$ $C^n_0$ $V$ $C^n_0$ #</td>
</tr>
<tr>
<td>All three syllable words:</td>
<td># $C^n_0$ $V$ $C^n_0$ $V$ $C^n_0$ $V$ $C^n_0$ #</td>
</tr>
<tr>
<td>Vowel in the last syllable (ULTIMA):</td>
<td><code>/ $C^n_0$ #</code></td>
</tr>
<tr>
<td>Vowel in the next to last syllable (PENULT):</td>
<td><code>/ $C^n_0$ $V$ $C^n_0$ #</code></td>
</tr>
<tr>
<td>Vowel in the third to last syllable (ANTEPENULT):</td>
<td><code>/ $C^n_0$ $V$ $C^n_0$ $V$ $C^n_0$ #</code></td>
</tr>
</tbody>
</table>
SUMMARY OF ENGLISH SOUNDS AND SPELLING

VOWELS:

[i] beat, beet, Caesar, people, we, machine, receive, believe
[\v] bit, into, been, abyss, fountain, button, language
[u] boot, who, duty, through, too, to, two, new, nuisance, blue
[\v\v] put, wood, would, butcher, woman
[e] bait, fate, great, eight, rain, reign, rein, they, hay, gauge
[e] bet, dead, said, guest, many, friend, says, jeopardy
[C] butted, roses, alone, sofa, the
[O] boat, so, sew, own, though, plateau, toe, soul, brooch
[I] bought, caught, chalk, saw, awful, author, sore, soar, four
[æ] bat, laugh, plaid
[\v\v\v] but, does, tough, flood, ton, country
[a] pot, palm, far, sergeant, ox

DIPHTHONGS:

[\v\y] boy, soil
[ay] sigh, nice, guy, lie
[aw] cow, house

GLIDES:

[w] wish, when, queen
[y] yes, beyond, use, feud
[h] high, whole

LIQUIDS:

[l] lave, drill, along, willing
[r] rich, car, bury, furry
[D] water, later, latter, ladder, writer, rider, party
NASALS:

[m] mess, hymn, hum, swimming
[n] neat, kin, winning, pneumonia, knife
[ŋ] sing, think, tongue

STOPS:

[pʰ] pain, prune, plaque, appear, shrimps, hiccoughing
[p] spit, spun, spring, expose
[b] broom, crabs, rubber
[tʰ] tip, tough, pterodactyl, intend, attack
[t] stick, stun, string, extend
[d] dig, bad, killed, heard, mending
[kʰ] keep, cat, chord, quite, pickle, accommodate, antiquing
[k] skit, scum, school, screw, excuse
[g] give, bag, egg, rogue

FRICATIVES:

[f] first, stuff, telephone, rough
[v] value, sliver, of
[ʃ] thin, breath, teeth, ether, both, thing
[ð] then, breathe, teethe, either
[s] sin, this, cross, science, ceiling, race, psychology
[z] zoo, drizzle, was, xylophone, scissors
[ʃ] show, chute, flash, issue, conscious, sure, mansion, racial
[ʒ] measure, azure, prestige, illusion

AFFRICATES:

[ɬ] chin, kitchen, question, righteous, much
[ʃ] jig, judgment, ridge, gem, graduation, region
EXERCISES FOR CHAPTER TWO

1. Transcribe the following English words (Answers in Appendix A):

   rich   ridge   ring   wring   wrist
   bush   butch   budge   box   buzz
   gem   Jim   sham   chum   gum
   ice   eyes   east   eased   oozed
   race   raise   rays   rise   rose
   lose   loose   louse   chose   choose
   cease   seize   seas   says   size
   chef   chief   chic   sheik   shack
   worth   earth   teethe   bathe   bath
   them   this   thumb   thing   then
   debt   vex   Scotch   broth   knot
   maize   quiche   squish   queue   shrew
   though   cough   rough   bough   through
   heard   word   bird   curd   nerd
<table>
<thead>
<tr>
<th>weird</th>
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<th>cord</th>
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<td>wedge</td>
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<td>wood</td>
<td>would</td>
<td>wooed</td>
<td>hood</td>
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</table>

2. Transcribe the following English words (Answers in Appendix A):
music   physics   psychic   sonic   helix

passion   cashier   cushion   caption   cashmere

thistle   thimble   tumble   dangle   dinghy

champagne   cartoon   Khartoum   careen   gangrene

immune   impugn   impinge   syringe   obscene

rational   racer   razor   sugar   quota

pleasure   pledger   leisure   azure   seizure

scissors   vision   fusion   ocean   mission

beauty   booty   purely   poorly   pearly

quitter   water   rider   writer   raider

joining   whining   singing   finger   languor

cavil   navel   ravel   gable   squabble

Mary   marry   merry   quarry   query

numbskull   zigzag   homegrown   deathblow   shipshape

outboard   marshlands   whiplash   pastime   pitchfork

cutthroat   whetstone   hangman   onslaught   crabgrass

3. Transcribe the following words including placement of primary stress ('). You can ignore aspiration and release. (v) = verb; (n) = noun.

agree   debris   ennui   Pawnee   marquee
angry money sunny gypsy litchi

survey (v) Bombay bouquet inveigh parfait

survey (n) bomb bay Tuesday foray subway

review canoe shampoo construe eschew

preview igloo curfew yahoo Zulu

below outgrow plateau Bordeaux although

bellow meadow hobo cocoa depot

outcry (v) apply goodbye sky high untie

outcry (n) ally cacti fish fry pigsty

soda tchotchke bwana chutzpah geisha

4. Transcribe the following words including placement of primary stress ('). You can ignore aspiration and release. (v) = verb; (n) = noun.

broccoli apogee fricassee symphony pedigree

shillelagh Chianti bologna confetti Hatari

guarantee bourgeoisie chimpanzee Tennessee jamboree

runaway Saturday ricochet protégée workaday

matinée San José Chevrolet Santa Fé overplay

rendevous residue peekaboo honeydew avenue
Transcribe the following words including placement of primary stress ('). You can ignore aspiration and release. (v) = verb; (n) = noun.

5. apostrophe Menominee Penelope fraternity telegraphy

Ypsilanti kamikaze Cincinnati insincerely poison ivy

pistachio Arapaho imbroglio adagio portfolio

armadillo Filipino virtuoso Sacramento lucky fellow

Arabia azalea Bulgaria et cetera America

hullabaloo Kalamazoo Tippecanoe

6. In each of the following, supply English words that contain the sound given in as many different spellings as you can. Underline the letters representing the sound in the answer.

[f] Answer: physics, fish, enough

a. [i] Answer:
7. Supply the symbol corresponding to each of the following phonetic descriptions.

- **voiced velar stop consonant** Answer: [g]
- **lax mid back rounded vowel** Answer:
- **voiced alveolar liquid** Answer:
- **voiceless palatal affricate consonant** Answer:
- **tense low back unrounded vowel** Answer:
- **voiceless alveolar fricative consonant** Answer:
- **voiced palatal liquid** Answer:
- **voiceless bilabial stop consonant** Answer:

b. [r] Answer:
c. [k] Answer:
d. [ʂ] Answer:
e. [y] Answer:
f. [e] Answer:
g. [o] Answer:
h. [ŋ] Answer:
i. [ɛ] Answer:
j. [ɻ] Answer:
h. tense high front unrounded vowel  
  Answer:

i. voiced velar nasal consonant  
  Answer:

j. voiced labiodental fricative consonant  
  Answer:

8. Write a phonetic description for each of the following symbols.

   [g] Answer: voiced velar stop consonant
   [o] Answer: tense mid back rounded vowel

   a. [h] Answer:
   b. [v] Answer:
   c. [e] Answer:
   d. [o] Answer:
   e. [ž] Answer:
   f. [»] Answer:
   g. [æ] Answer:
   h. [n] Answer:
   I. [¥] Answer:
   j. [c] Answer:

9. In each of the following, all but one of the sounds listed exhaustively comprise a natural class of sounds for English. Identify the sound that does not belong in the natural class AND name the feature or features that define the class.

   [k], [d], [g], [b]  
   Choice: [k]  
   Class: [+VOICED, +STOP]

a. [a], [e], [ŋ], [æ]  
   Choice:
   Class:
b. [k], [ê], [h], [g] Choice: 
Class:

c. [z], [ɻ], [ð], [ž], [v] Choice: 
Class:

d. [t], [ʃ], [z], [ð], [s] Choice: 
Class:

e. [u], [ɻ], [o], [e], [i] Choice: 
Class:

f. [w], [h], [y], [ɻ] Choice: 
Class:

g. [u], [o], [a], [ią], [i] Choice: 
Class:

h. [m], [w], [v], [b], [p] Choice: 
Class:

I. [u], [i], [e], [ɻ], [ią] Choice: 
Class:

j. [ê], [m], [n], [h], [ń] Choice: 
Class:

10. State the following rules using formal devices (Answers in Appendix A).

Example: A nasal consonant is deleted before another nasal consonant at the beginning of a word.

Answer: [+CONSONANT, +NASAL] Ξ Ø / #____ [+CONSONANT, +NASAL]

a. All intervocalic voiceless stops become voiced.
b. Nontense vowels in the final syllable of a word are stressed when they are followed by
two or more consonants.

c. Delete all final consonants when the following word begins with a consonant.

d. Reduce all unstressed vowels to schwa.

e. Palatalize all alveolar stops before [y].

f. Devoice all final fricatives.

g. Aspirate all initial voiceless stops.

h. Nasalize all vowels before a nasal consonant.

I. A lax vowel in the antepenultimate syllable of a word is stressed.

j. Palatalize all alveolar stops before [y] when they are preceded by a vowel or when they
are initial.

11. In Classical Latin, nouns have different endings (CASES) depending on their use in a
sentence. For example, a noun functioning as the SUBJECT of a sentence has a
NOMINATIVE CASE ending. One functioning as a POSSESSIVE phrase has a GENITIVE CASE ending. Consider the following, where a macron over a vowel means the vowel is long:

<table>
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<tr>
<th>NOMINATIVE</th>
<th>GENITIVE</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>arks</td>
<td>arkis</td>
<td>enclosure</td>
</tr>
<tr>
<td>duks</td>
<td>dukis</td>
<td>leader</td>
</tr>
<tr>
<td>daps</td>
<td>dapis</td>
<td>feast</td>
</tr>
<tr>
<td>r̄ks</td>
<td>r̄gis</td>
<td>king</td>
</tr>
<tr>
<td>s̄ps</td>
<td>s̄pis</td>
<td>snake</td>
</tr>
<tr>
<td>falanks</td>
<td>falangis</td>
<td>phalanx</td>
</tr>
<tr>
<td>urps</td>
<td>urbis</td>
<td>city</td>
</tr>
<tr>
<td>pleps</td>
<td>plebis</td>
<td>people</td>
</tr>
</tbody>
</table>

a. In terms of these data, what are the morphemes for the NOMINATIVE and the GENITIVE?

b. What is the Latin morpheme for each of the following?

   (1) enclosure  
   (2) leader  
   (3) feast  
   (4) king  
   (5) snake  
   (6) phalanx  
   (7) city  
   (8) people

c. State any phonological rule(s) applicable in the above Latin data.
12. Consider the following additional Classical Latin data:

<table>
<thead>
<tr>
<th>NOMINATIVE</th>
<th>GENITIVE</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>ἴσ</td>
<td>ἴσ tis</td>
<td>strife</td>
</tr>
<tr>
<td>fraws</td>
<td>frawdis</td>
<td>deceit</td>
</tr>
<tr>
<td>frÇns</td>
<td>frÇntis</td>
<td>brow</td>
</tr>
<tr>
<td>frÇns</td>
<td>frÇndis</td>
<td>leaf</td>
</tr>
<tr>
<td>dens</td>
<td>dentis</td>
<td>tooth</td>
</tr>
<tr>
<td>sors</td>
<td>sortis</td>
<td>lot</td>
</tr>
</tbody>
</table>

a. What are the morphemes for the NOMINATIVE and the GENITIVE?

b. Give the Latin morphemes for each of the following:

(1) strife
(2) deceit
(3) brow
(4) leaf
(5) tooth
(6) lot

c. State any phonological rule(s) in addition to those from the previous problem.
## APPENDIX A: ANSWERS TO EXERCISES

1. **rich** \(\text{[r\textipa{v\textipa{f}}]}\)  \**ridge** \(\text{[r\textipa{v\textipa{g}}]}\)  \**ring** \(\text{[r\textipa{v\textipa{g}}]}\)  \**wring** \(\text{[r\textipa{v\textipa{g}}]}\)  \**wrist** \(\text{[r\textipa{v\textipa{g}t}]}\)  

**bush** \(\text{[b\textipa{v\textipa{g}t}]}\)  \**butch** \(\text{[b\textipa{v\textipa{g}t}]}\)  \**budge** \(\text{[b\textipa{v\textipa{g}t}]}\)  \**box** \(\text{[b\textipa{v\textipa{g}s]}\)  \**buzz** \(\text{[b\textipa{v\textipa{g}t}]}\)  

**gem** \(\text{[\textipa{g\textipa{m}n]}\)  \**Jim** \(\text{[\textipa{g\textipa{m}n]}\)  \**sham** \(\text{[\textipa{s\textipa{m}n]}\)  \**chum** \(\text{[\textipa{\textipa{v\textipa{m}n}]}\)  \**gum** \(\text{[\textipa{g\textipa{m}n]}\)  

**ice** \(\text{[\textipa{v\textipa{s}]}\)  \**eyes** \(\text{[\textipa{v\textipa{s}]}\)  \**east** \(\text{[\textipa{i\textipa{v}\textipa{s}]}\)  \**eased** \(\text{[\textipa{i\textipa{v}\textipa{s}d]}\)  \**oozed** \(\text{[\textipa{i\textipa{v}\textipa{s}d]}\)  

**race** \(\text{[r\textipa{z}\textipa{s}]}\)  \**raise** \(\text{[r\textipa{z}\textipa{s}]}\)  \**rays** \(\text{[r\textipa{z}\textipa{s}]}\)  \**rise** \(\text{[r\textipa{z}\textipa{s}]}\)  \**rose** \(\text{[r\textipa{z}\textipa{s}]}\)  

**lose** \(\text{[l\textipa{u\textipa{s}]}\)  \**loose** \(\text{[l\textipa{u\textipa{s}]}\)  \**louse** \(\text{[l\textipa{u\textipa{s}]}\)  \**chose** \(\text{[l\textipa{u\textipa{s}]}\)  \**choose** \(\text{[l\textipa{u\textipa{s}]}\)  

**cease** \(\text{[s\textipa{z}\textipa{s}]}\)  \**seize** \(\text{[s\textipa{z}\textipa{s}]}\)  \**seas** \(\text{[s\textipa{z}\textipa{s}]}\)  \**says** \(\text{[s\textipa{z}\textipa{s}]}\)  \**size** \(\text{[s\textipa{s}\textipa{z}]}\)  

**chef** \(\text{[\textipa{s\textipa{f}}\textipa{f}]}\)  \**chief** \(\text{[\textipa{s\textipa{f}}\textipa{f}]}\)  \**chic** \(\text{[\textipa{s\textipa{i\textipa{k}}]}\)  \**sheik** \(\text{[\textipa{s\textipa{i\textipa{k}}]}\)  \**shack** \(\text{[\textipa{s\textipa{e\textipa{k}}]}\)  

**worth** \(\text{[w\textipa{r\textipa{m}z}]}\)  \**earth** \(\text{[\textipa{r\textipa{m}z}]}\)  \**teethe** \(\text{[t\textipa{h\textipa{i\textipa{d}}]}\)  \**bathe** \(\text{[b\textipa{d}}\textipa{o]}\)  \**bath** \(\text{[b\textipa{d}}\textipa{z}]}\)  

**them** \(\text{[\textipa{d\textipa{m}n]}\)  \**this** \(\text{[\textipa{d\textipa{m}n]}\)  \**thumb** \(\text{[\textipa{i\textipa{d}}\textipa{m}]}\)  \**thing** \(\text{[\textipa{i\textipa{d}}\textipa{m}]}\)  \**then** \(\text{[\textipa{d\textipa{m}n]}\)  

**debts** \(\text{[d\textipa{e\textipa{r}]}\)  \**vex** \(\text{[v\textipa{e\textipa{k}s}]}\)  \**Scotch** \(\text{[sk\textipa{a\textipa{r}}]}\)  \**broth** \(\text{[b\textipa{r}\textipa{m}]}\)  \**knot** \(\text{[n\textipa{t}]}\)  

**maize** \(\text{[m\textipa{z}]}\)  \**quiche** \(\text{[k\textipa{i\textipa{\vtextipa{r}}}]}\)  \**squish** \(\text{[sk\textipa{w\textipa{v}}]}\)  \**queue** \(\text{[k\textipa{y\textipa{u}]}\)  \**shrew** \(\text{[\textipa{s\textipa{r}}]}\)  

**though** \(\text{[\textipa{\vtextipa{f}}\textipa{f}]}\)  \**cough** \(\text{[k\textipa{f}]}\)  \**rough** \(\text{[k\textipa{f}]}\)  \**bough** \(\text{[k\textipa{f}]}\)  \**through** \(\text{[\textipa{k\textipa{f}r]}\)  

**heard** \(\text{[h\textipa{c\textipa{r}d}]}\)  \**word** \(\text{[w\textipa{c\textipa{r}d}]}\)  \**bird** \(\text{[b\textipa{c\textipa{r}d}]}\)  \**curd** \(\text{[k\textipa{c\textipa{r}d}]}\)  \**nerd** \(\text{[n\textipa{c\textipa{r}d}]}\)  

**weird**  \**feared**  \**veered**  \**cared**  \**cord**
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4. broccoli | apogee | fricase | symphony | pedigree |
<p>| [brákCli]   | [æpɛ'ʃi]    | [frɪkæsɪ]   | [sɪmfoʊni] | [pɪdɪgri] |
| shillelagh | chianti    | bologna     | confetti   | Hatari     |
| [ʃCléli]    | [kiyánti]   | [bClóni]    | [kCnfɛ'Di] | [hCtári]   |
| guarantee   | bourgeois   | chimpanzee  | Tennessee  | jamboree   |
| [ɡærCn̩ti] | [bʊr'zɔzɪ] | [ˈtʃɪmənzi] | [ˈtenzni] | [ˈʒæmbΧri] |
| runaway     | Saturday    | ricochet    | protégée   | workaday   |
| [rʌ'kCwe]   | [sæDCrde]   | [rɪkøtʃ]    | [prɔtɡe]   | [wɔ'kCde]   |
| matinée     | San José    | Chevrolet   | Santa Fé   | overplay   |
| [mætCn̩]   | [sænhozé]   | [ʃɛvrClé]   | [sænt(ə)ʃfe] | [ɒvCrapl] |
| rendezvous  | residue     | peekaboo    | honeydew   | avenue     |
| [rændevu]   | [rɛCdu]     | [piCbu]     | [hʌ'niду]  | [ævN̩u]    |</p>
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PHONOLOGICAL RULES

1. a. All intervocalic voiceless stops become voiced.
   
   b. Voiceless stops become voiced when intervocalic.
   
   c. \([\text{+STOP} \text{-VOICED}] \rightarrow [\text{+STOP} \text{+VOICED}] \) / \(V \text{__________} V\)
   
   d. \([\text{-CONTINUANT}] \rightarrow [\text{-CONTINUANT}] \) / \(V \text{__________} V\)
   
   e. \([\text{-VOICED}] \rightarrow \text{[+VOICED]} \) / \(V \begin{array}{c} \text{-CONTINUANT} \\ \text{-NASAL} \end{array} \) \(V\)

2. a. Nontense vowels in the final syllable of a word are stressed when they are followed by two or more consonants.

   b. Nontense vowels become stressed when followed by two or more consonants in the final syllable of a word.
   
   c. \([\text{-TENSE}] \begin{array}{c} \text{Ø} \\ \text{+STRESS} \end{array} \) / \(\text{__________} \) # \(C^n_2\)

3. a. Delete all final consonants when the following word begins with a consonant.

   b. Consonants become zero when final and when the following word begins with a consonant.
   
   c. \(C \begin{array}{c} \text{Ø} \end{array} \) / \(\text{__________} \) C #

4. a. Reduce all unstressed vowels to schwa.

   b. Unstressed vowels become schwa.
   
   c. \([\text{-STRESS}] \begin{array}{c} \text{Ø} \end{array} \) \([\text{c}]\)

5. a. Palatalize all alveolar stops before [\(y\)].
b. Alveolar stops become palatal before [y].

c. $\begin{align*}
&[+\text{STOP} \\
&+\text{ALVEOLAR}] \\
&\rightarrow [+\text{STOP} \\
&+\text{PALATAL}] \\
&\end{align*}$ / $\begin{align*}
&\text{[y]} \\
&\end{align*}$

d. $\begin{align*}
&[-\text{CONTINUANT} \\
&-\text{NASAL} \\
&+\text{CORONAL} \\
&+\text{ANTERIOR}] \\
&\rightarrow [-\text{CONTINUANT} \\
&-\text{NASAL} \\
&+\text{CORONAL} \\
&-\text{ANTERIOR}] \\
&\end{align*}$ / $\begin{align*}
&\text{[y]} \\
&\end{align*}$

e. $\begin{align*}
&[+\text{ANTERIOR}] \\
&\rightarrow [-\text{ANTERIOR}] \\
&\end{align*}$ / $\begin{align*}
&-\text{CONTINUANT} \\
&-\text{NASAL} \\
&+\text{CORONAL} \\
&\end{align*}$

6. a. Devoice all final fricatives.

b. Fricatives become voiceless when final (before #).

c. $\begin{align*}
&[+\text{FRICATIVE} \\
&+\text{VOICED}] \\
&\rightarrow [-\text{VOICED}] \\
&\end{align*}$ / $\begin{align*}
&\text{#} \\
&\end{align*}$

d. $\begin{align*}
&[-\text{SONORANT} \\
&+\text{CONTINUANT} \\
&+\text{VOICED}] \\
&\rightarrow [-\text{SONORANT} \\
&+\text{CONTINUANT} \\
&-\text{VOICED}] \\
&\end{align*}$ / $\begin{align*}
&\text{#} \\
&\end{align*}$

e. $\begin{align*}
&[+\text{VOICED}] \\
&\rightarrow [-\text{VOICED}] \\
&\end{align*}$ / $\begin{align*}
&-\text{SONORANT} \\
&+\text{CONTINUANT} \\
&\end{align*}$

7. a. Aspirate all initial voiceless stops.

b. Voiceless stops become aspirate when initial (after #).

c. $\begin{align*}
&[+\text{STOP} \\
&-\text{VOICED} \\
&-\text{ASPIRATE}] \\
&\rightarrow [+\text{STOP} \\
&-\text{VOICED} \\
&+\text{ASPIRATE}] \\
&\end{align*}$ / $\begin{align*}
&\text{#} \\
&\end{align*}$
8. a. Nasalize all vowels before a nasal consonant.
   b. Vowels become nasal before nasal consonants.
   c. $V \Xi [+\text{NASAL}] / \ldots [C, +\text{NASAL}]$

9. a. A lax vowel in the antepenultimate syllable of a word is stressed.
   b. Nontense vowels become stressed in antepenultimate syllables.
   c. $[-\text{TENSE}] \Xi [+\text{STRESS}] / \ldots C^0_0 V C^0_0 V C^0_0 #$

10. a. Palatalize all alveolar stops before [y] when they are preceded by a vowel or when they are initial.
    b. Alveolar stops become palatal before [y] when they are preceded by a vowel or by #.
    c. $[+\text{STOP} +\text{ALVEOLAR}] \rightarrow [+\text{STOP} +\text{PALATAL}] / \{V, #\} \ldots [y]$
    d. $[-\text{CONTINUANT} -\text{NASAL} +\text{CORONAL} +\text{ANTERIOR}] \rightarrow [-\text{CONTINUANT} -\text{NASAL} +\text{CORONAL} -\text{ANTERIOR}] / \{V, #\} \ldots [y]$
    e. $[+\text{ANTERIOR}] \rightarrow [-\text{ANTERIOR}] / \{V, #\} [-\text{CONTINUANT} -\text{NASAL} +\text{CORONAL}] [y]$
APPENDIX B: SLASH–DASH NOTATION

1. Data.

ROOT MEANING EXAMPLES

\(/skr\) write scribble \(/skr+c/ [skrc]\
script \(/skr+t/ [skrt]\

\(/fræg/ break fragment \(/fræg+m/ [frægm]\
refract \(/ri+fræg+t/ [rifrækt]\

2. First Set of Rules.

a. \([bt] E [pt]\
b. \([gt] E [kt]\

3. Revision One.

\([b] E [p] / _______ [t]\
\([g] E [k] / _______ [t]\

4. Revision Two.

\([+STOP -CORONAL ] \rightarrow [+STOP -CORONAL ] / \ [+STOP +CORONAL ]\
\([+VOICED ] \rightarrow [-VOICED ] / \ [+STOP +CORONAL ]\

5. Revision Three.

\([+VOICED ] \rightarrow [-VOICED ] / \ [+STOP +CORONAL ]\

APPENDIX C: PHONOLOGY PROBLEM

Data in phonetic transcription from the language Hip:

<table>
<thead>
<tr>
<th>SINGULAR</th>
<th>PLURAL</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>tip</td>
<td>tiben</td>
<td>girl</td>
</tr>
<tr>
<td>pit</td>
<td>piden</td>
<td>boy</td>
</tr>
<tr>
<td>kip</td>
<td>kiben</td>
<td>child</td>
</tr>
<tr>
<td>pik</td>
<td>pigen</td>
<td>police</td>
</tr>
<tr>
<td>tab</td>
<td>taben</td>
<td>teacher</td>
</tr>
<tr>
<td>bid</td>
<td>biden</td>
<td>dogs</td>
</tr>
<tr>
<td>gip</td>
<td>giben</td>
<td>car</td>
</tr>
<tr>
<td>dag</td>
<td>dagen</td>
<td>cat</td>
</tr>
<tr>
<td>tap</td>
<td>_____</td>
<td>house</td>
</tr>
<tr>
<td>____</td>
<td>giden</td>
<td>lions</td>
</tr>
</tbody>
</table>

1. What are the stop phonemes in Hip? Justify your answer with minimal pairs.

2. What is the phonemic form for children?

3. What is the phonetic form for houses?

4. What is the phonemic form for lions?

5. State the rules which accounts for the phonetic differences between the singular and the plural forms where they occur?

6. What is the morpheme for PLURAL?

7. What is the morpheme for SINGULAR?

APPENDIX D: MORPHOLOGY PROBLEM
Consider the following phonetic transcriptions and translations of Blatin:

<table>
<thead>
<tr>
<th>Pelam</th>
<th>I wash</th>
<th>Nores</th>
<th>You work</th>
<th>Katim</th>
<th>I jump</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pelat</td>
<td>he washes</td>
<td>Noret</td>
<td>he works</td>
<td>Katis</td>
<td>you jump</td>
</tr>
<tr>
<td>Pelabas</td>
<td>you washed</td>
<td>Norebam</td>
<td>I worked</td>
<td>Katibam</td>
<td>I jumped</td>
</tr>
<tr>
<td>Pelabat</td>
<td>he washed</td>
<td>Norebas</td>
<td>you worked</td>
<td>Katibat</td>
<td>he jumped</td>
</tr>
<tr>
<td>Pelabim</td>
<td>I will wash</td>
<td>Norebis</td>
<td>you will work</td>
<td>Katibim</td>
<td>I will jump</td>
</tr>
<tr>
<td>Pelabis</td>
<td>you will wash</td>
<td>Norebit</td>
<td>he will work</td>
<td>Katibit</td>
<td>he will jump</td>
</tr>
</tbody>
</table>

Identify the following morphemes:

- first person (I) ______________________
- second person (you) ______________________
- third person (he) ______________________
- present tense ______________________
- past tense ______________________
- future tense ______________________

What do the following mean:

- pelas ______________________
- norebim ______________________

How does one say the following in Blatin:

- He will wash. ______________________
- You worked. ______________________
- He jumps. ______________________
APPENDIX E: ENGLISH VOWEL SHIFT

1. e \([-\text{HIGH}, -\text{LOW}, -\text{BACK}, +\text{TENSE}]\) \([\text{beð}]\) \([\text{sen}]\) \([\text{eksplən}]\) 
   (bathe) (sane) (explain)

æ \([-\text{HIGH}, +\text{LOW}, -\text{BACK}, -\text{TENSE}]\) \([\text{bæ}^\text{›}]\) \([\text{sæn\text{Di}}]\) \([\text{eksplæn\text{tori}}]\) 
   (bath) (sanity) (explanatory)

2. o \([-\text{HIGH}, -\text{LOW}, +\text{BACK}, +\text{TENSE}]\) \([\text{noz}]\) \([\text{fon}]\) \([\text{tel\text{Cskop}}]\) 
   (nose) (phone) (telescope)

æ \([-\text{HIGH}, +\text{LOW}, +\text{BACK}, +\text{TENSE}]\) \([\text{nastrcl}]\) \([\text{fan\text{W}}]\) \([\text{tel\text{Cskap\text{W}}}]\) 
   (nostril) (phonic) (telescopic)

3. i \([+\text{HIGH}, -\text{LOW}, -\text{BACK}, +\text{TENSE}]\) \([\text{slip}]\) \([\text{mitCr}]\) \([\text{ridim}]\) 
   (sleep) (meter) (redeem)

æ \([-\text{HIGH}, -\text{LOW}, -\text{BACK}, -\text{TENSE}]\) \([\text{sl\text{ept}}]\) \([\text{met\text{W}}]\) \([\text{rid\text{emp\text{S}Cn}}]\) 
   (slept) (metric) (redemption)

4. u \([+\text{HIGH}, -\text{LOW}, +\text{BACK}, +\text{TENSE}]\) \([\text{luz}]\) \([\text{gus}]\) \([\text{fud}]\) 
   (lose) (goose) (food)

æ \([-\text{HIGH}, -\text{LOW}, +\text{BACK}, -\text{TENSE}]\) \([\text{l\text{st}}]\) \([\text{g\text{sli\text{E}}}]\) \([\text{f\text{dCr}}]\) 
   (lost) (gosling) (fodder)

5. ay \([-\text{HIGH}, +\text{LOW}, +\text{BACK}, +\text{TENSE}]\) \([\text{wayd}]\) \([\text{layn}]\) \([\text{\text{W\text{nayt}}}]}\) 
   (wide) (line) (ignite)

æ \([+\text{HIGH}, -\text{LOW}, -\text{BACK}, -\text{TENSE}]\) \([\text{w\text{W}}}]\) \([\text{lu\text{iCr}}]\) \([\text{\text{W\text{W\text{C}n}}}]}\) 
   (width) (linear) (ignition)

6. aw \([-\text{HIGH}, +\text{LOW}, +\text{BACK}, +\text{TENSE}]\) \([\text{saw\text{›}}}]\) \([\text{Cb\text{awnd}}]\) \([\text{prof\text{awnd}}}]\) 
   (south) (abound) (profound)

æ \([+\text{HIGH}, +\text{LOW}, -\text{BACK}, -\text{TENSE}]\) \([\text{s\text{3\text{o}Cn}}}]\) \([\text{Cb\text{3\text{dC}nt}}]\) \([\text{prof\text{3\text{dCDi}}}]}\) 
   (southern) (abundant) (profundity)
### APPENDIX F: ENGLISH MORPHOLOGY

**1. Root /æg/ ‘do’:**

<table>
<thead>
<tr>
<th>/PHONOLOGICAL FORM/</th>
<th>[PHONETIC FORM]</th>
<th>SPELLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. /æg + ənt/</td>
<td>[eɡɛnt]</td>
<td>agent</td>
</tr>
<tr>
<td>1. Vowel Shift:</td>
<td>æ &gt; e</td>
<td>in certain contexts</td>
</tr>
<tr>
<td></td>
<td>sanity/sane; profanity/profane; explanatory/explain; gratitude/grateful</td>
<td></td>
</tr>
<tr>
<td>2. Velar Softening:</td>
<td>g &gt; j</td>
<td>in certain contexts</td>
</tr>
<tr>
<td></td>
<td>rigor/rigid; regal/regicide; allegation/allege; analogous/analogize</td>
<td></td>
</tr>
<tr>
<td>b. /æg + ənt + I/</td>
<td>[eɡɛnsi]</td>
<td>agency</td>
</tr>
<tr>
<td></td>
<td>president/presidency; democrat/democracy; pirate/piracy; regent/regency</td>
<td></td>
</tr>
<tr>
<td>c. /æg + t/</td>
<td>[ækt]</td>
<td>act</td>
</tr>
<tr>
<td></td>
<td>regal/direct; fragment/refract; segment/bisect; pigment/depict</td>
<td></td>
</tr>
<tr>
<td>d. /æg + t + w/</td>
<td>[æktw]</td>
<td>active</td>
</tr>
<tr>
<td>e. /æg + t + w + wI/</td>
<td>[æktwCDi]</td>
<td>activity</td>
</tr>
<tr>
<td>f. /æg + t + w + w + z/</td>
<td>[æktwCDiz]</td>
<td>activities</td>
</tr>
<tr>
<td>g. /w + æg + t + w/</td>
<td>[wæktw]</td>
<td>inactive</td>
</tr>
<tr>
<td>h. /æg + t + wɛn/</td>
<td>[ækʃɛn]</td>
<td>action</td>
</tr>
<tr>
<td></td>
<td>relate/relation; devote/devotion; omit/omission; complete/completion</td>
<td></td>
</tr>
<tr>
<td>I. /trænz + æg + t + wɛn + æl/</td>
<td>[trænzækʃɛnɛl]</td>
<td>transactional</td>
</tr>
<tr>
<td>j /rɪ + æg + t + r + z/</td>
<td>[riæktɛrz]</td>
<td>reactors</td>
</tr>
</tbody>
</table>

**2. Root /rɛɡ/ ‘rule’:**

<table>
<thead>
<tr>
<th>/PHONOLOGICAL FORM/</th>
<th>[PHONETIC FORM]</th>
<th>SPELLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. /rɛɡ + ənt/</td>
<td>[rɪɡɛnt]</td>
<td>regent</td>
</tr>
<tr>
<td>1. Vowel Shift:</td>
<td>e &gt; I</td>
<td>in certain contexts</td>
</tr>
<tr>
<td></td>
<td>serenity/serene; severity/severe; delicacy/delicious; metric/meter</td>
<td></td>
</tr>
<tr>
<td>2. Velar Softening:</td>
<td>g &gt; j</td>
<td>in certain contexts</td>
</tr>
<tr>
<td></td>
<td>rigor/rigid; regal/regicide; allegation/allege; analogous/analogize</td>
<td></td>
</tr>
<tr>
<td>b. /rɛɡ + ənt + I/</td>
<td>[rɪɡɛnsi]</td>
<td>regency</td>
</tr>
<tr>
<td>c. /dɪ + rɛɡ + t/</td>
<td>[dCRɛkt]</td>
<td>direct</td>
</tr>
<tr>
<td>d. /dɪ + rɛɡ + t + wɛn + z/</td>
<td>[dCRekʃɛnɛz]</td>
<td>directions</td>
</tr>
<tr>
<td>e. /w + rɛɡ + ul + ær + w + z/</td>
<td>[wɛɡyularɛDiz]</td>
<td>irregularities</td>
</tr>
<tr>
<td></td>
<td>regular/regulate; tabular/tabulate; circular/circulate; particular/particulate</td>
<td></td>
</tr>
</tbody>
</table>
(3) Root /fræg/ ‘break’:

a. /fræg + mənt/ > [frægmənt] fragment
b. /fræg + w/ > [frægw] fragile
c. /rɪ + fræg + t/ > [rifrækt] refract

(4) Root /læg/ ‘law’:

a. /læg + æl/ > [ligl] legal
b. /læg + w + let + wən/ > [lešClešCn] legislation
c. /w + læg + wɪn + et/ > [wɪCwɪCmCt] illegitimate

(5) Root /læg/ ‘choose’:

a. /l + læg + ebw/ > [elCebC]l eligible
b. /l + læg + t + wən/ > [lešCn] election
c. /læg + end + æri/ > [lændæri] legendary

(6) Root /seɡ/ ‘cut’:

a. /seɡ + mənt/ > [segmənt] segment
b. /seɡ + t + wən/ > [sekšn] section
c. /dis + seɡ + t/ > [daysekt] dissect

(7) Root /pʊɡ/ ‘paint’:

a. /pʊɡ + mənt/ > [pʊgmənt] pigment
b. /di + pʊɡ + t/ > [dipɪkt] depict
c. /pʊɡ + t + or + l + æl/ > [pʊktorɪl] pictorial

(8) Root /mæɡ/ ‘great, more’:

a. /mæɡ + sʊn + æl/ > [mæksʊnæl] maximal
b. /mæɡ + w + ter + I + æl/ > [mæCsterɪl] magisterial
c. /mæɡ + or/ > [meɪɔr] major

(9) Root /ɪɡ/ ‘increase’:

a. /ɪɡ + mənt/ > [ɪgmənt] augment
b. /ɪɡ + t + wən/ > [ɪkʃn] auction
c. /w + ɪg + ur + et/ > [wɪŋyuret] inaugurate

(10) Root /pæɡ/ ‘fasten, agree’:

a. /pæɡ + ðent/ > [pægend] pageant
b. /w + pæɡ + t/ > [wɪpækt] impact
c. /pro + pæɡ + et/ > [prapəkta] propagate
3.1 PRELIMINARIES

The words of every sentence are arranged into units called **PHRASES**. There is both a left to right order of phrases, called **LINEAR ORDER**, and a top to bottom order of phrases, called **HIERARCHICAL ORDER**. Learning English consists in part of mastering these ordering constraints. Failure to observe the constraints on linear order can lead to ungrammaticality at any time during language acquisition. In adult language, (1b) is ungrammatical; in child language, (2b) is ungrammatical. Recall that an asterisk in front of a sentence means that the sentence is ungrammatical, that is, violates a grammatical rule.

(1)  
   a. The boy ran away.  
   b. *Boy the away ran.  

(2)  
   a. Daddy chair. (= That is daddy’s chair.)  
   b. Chair daddy. (≠ That is daddy’s chair.)

In addition, failure to observe linear order can lead to meaning changes in both adult language (3) and child language (4).

(3)  
   a. John saw Bill.  
   b. Bill saw John.

(4)  
   a. Mommy find. (= Mommy come and find me; I’m hiding.)  
   b. Find mommy. (= I will find mommy.)

Changes in hierarchical order often result in ambiguity, that is, multiple meanings. For example, the phrase *the Spanish history books* can be interpreted like *the art history books* or like *the Spanish math books*, as follows:

(5)  
   a. John has the Spanish history books.  
      (= the books on Spanish history)  
      John has the art history books.

   b. John has the Spanish history books.
The branch of linguistics that studies phrases, including aspects of linear and hierarchical ordering, is called **Syntax**. Formally, a **phrase** is a word or group of words that functions as a unit, which means that the language treats it as a whole. Phrases are identified by one or more of three syntactic processes mentioned in the Chapter One and reviewed here:

**Reference** is a binding relationship between phrases. Some phrases get their meaning only from identification with other phrases. For example, in *John hurt himself, himself* gets its meaning from its identification with *John*; we say *himself* refers to or is bound to *John*, and the relationship between the two is an instance of reference. Reference can occur in simple clauses like (6), between complex clauses like (7), and between separate sentences like (8) and (9).

(6) a. The painter cut himself.  
   (The phrase *himself* refers to the phrase *the painter*.)  
   b. The painters painted each other.  
   (The phrase *each other* refers to the phrase *the painters*.)

(7) a. The portrait of himself that Rembrandt liked the most is the one he painted last.  
   b. Yourself, you have to blame and no one else.

(8) a. Impressionist painters seem to use more blue than expressionist painters.  
   b. At least, I think they do.  
   (The phrase *they* refers to the phrase *impressionist painters*; the phrase *do* refers to the phrase *use more blue*)

(9) a. The children should not be playing with the paints.  
   b. Why did you give them them?  
   (the first *them* refers to *the children*; the second *them* refers to *the paints*)

**Omission** is the deletion of a phrase. Repeated occurrences of phrases may be left out. In such cases, the omitted phrase is understood to be identical to the given phrase. For example, one can say *John likes apples more than he likes bananas* or *John likes apples more than bananas*. 

(= the books on history in Spanish)  
John has the Spanish math books.
PLACEMENT is the occurrence of a phrase in a particular position. For example, the adverb phrase readily can be placed either before or after the verb it modifies: *John readily accepted or John accepted readily; however, it cannot be placed at the beginning of a sentence: *Readily, John accepted.

The three syntactic processes of reference, omission, and placement are possible because sentences are organized into phrases. The sentences of every human language contain phrases. Furthermore, phrase structure is a feature of the earliest sentences used by children regardless of the language they are learning. The exact character of phrases varies from language to language, but there is no known language which lacks phrase structure. Therefore, phrase structure is not an arbitrary convention; it must be rooted in human biology.

The biological origins of phrase structure become clear when one examines the nature of human memory. It is a well–known fact that human beings have very limited SHORT TERM MEMORY (STM), which is the immediate memory for new information, such as a telephone number just received from the operator. This contrasts with our virtually limitless LONG TERM MEMORY (LTM), which is the storage and recall of information that is not new, such as one’s mother’s maiden name.

Generally, STM is thought to be limited to about seven (± two) bits of information. STM can be facilitated by organizing information into units called CHUNKS. For example, the string of numbers in (10a) is much more readily recalled when given as (10b).

(10)  
   a. 1–4–9–2–2–0–0–1–1–7–7–6–1–9–9–7  

Given the reality of the chunk in psychological studies and the phrase in linguistic studies, it seems plausible to derive (11).

(11) The sentences of a natural language consist of phrases because human STM requires organizing a string of words into chunks to facilitate processing.

In short, a phrase is a chunk of a sentence. Syntax is the study of phrases. A linguist specifies phrase structure by examining the units that participate in reference, omission, and placement. This methodology is theory–independent; in fact, this is the method by which linguists develop theories of grammar. We can see this if we examine the development of grammatical theory in this century, specifically, the development from traditional grammar to structural grammar to generative grammar.

3.2 TRADITIONAL AND STRUCTURAL GRAMMAR
The oldest grammatical model in western civilization is TRADITIONAL GRAMMAR, a grammatical model that has evolved from the language studies of the Greeks and Romans. Such grammars contain definitions like (12).

(12) A SENTENCE is a structured expression consisting minimally of a SUBJECT and a PREDICATE. The subject specifies the topic of the sentence, and the predicate specifies what is asserted of the topic. Predicates always contain a VERB, which is a word that serves to express an action, occurrence or state of being; sometimes predicates also contain an OBJECT, which specifies the person or thing directly affected by the action defined in the verb. Since they must at least contain a verb, predicates are also referred to as VERB PHRASES. Subjects and objects are phrases that contain a NOUN, which is the name of a person, place, or thing, and a DETERMINER (DET), which is a word like the, this, or that.

According to these definitions, a sentence like (13a) might be graphically represented by the TREE DIAGRAM (13b).

(13) a. The passengers obey the stewardess.

While (13b) appears to be a fairly adequate representation of the phrases in (13a), there are problems. The first concerns an auxiliary or helping verb like must when it appears in a similar sentence like The passengers must obey the stewardess. (12) does not tell us what to do with it, in particular, it does not tell us whether an auxiliary is part of the SUBJECT node or the SENTENCE node or the VERB PHRASE node. This is important because we would like to be able to devise an explicit set of rules that describe the phrase structure of all English sentences. Since the left to right order of the elements in a sentence must be considered, we have three possibilities for connecting an auxiliary (AUX) with the rest of the sentences. We can represent the choices as follows, where the dotted lines indicate the possible attachments of AUX:

(14) a. The passengers must obey the stewardess.
b. If AUX is part of the SUBJECT, then the tree diagram for an English sentence is (15a), and the PHRASE–STRUCTURE RULES (PS–RULES) that describe English sentences are (15b), where the arrow can be interpreted as ‘consists of.

(15) a.

\[
\begin{align*}
\text{SENTENCE} & \rightarrow \text{SUBJECT} + \text{VERB PHRASE} \\
\text{SUBJECT} & \rightarrow \text{DET} + \text{NOUN} + \text{AUX} \\
\text{VERB PHRASE} & \rightarrow \text{VERB} + \text{OBJECT} \\
\text{OBJECT} & \rightarrow \text{DET} + \text{NOUN}
\end{align*}
\]

b. (1) SENTENCE $\xi$ SUBJECT + VERB PHRASE
(2) SUBJECT $\xi$ DET + NOUN + AUX
(3) VERB PHRASE $\xi$ VERB + OBJECT
(4) OBJECT $\xi$ DET + NOUN

If AUX is part of the SENTENCE, then the tree diagram for an English sentence is (16a), and the PS–RULES that describe English sentences are (16b).
Lastly, if AUX is part of the VERB PHRASE, then the tree diagram for an English sentence is (17a), and the PS–RULES that describe English sentences are (17b).

(17) a.

Traditional grammarians were not concerned much with the objective justification of the statements they made about grammar. The choice between analyses like the above was often, quite simply, a matter of opinion. All modern theories of grammar take a very different point of view. All modern theories of linguistics (those of the twentieth century) attempt to ground their analyses in terms of structural principles which can be justified, that is, proven. The further into the twentieth century
one gets in the development of grammatical theory, the more stringent the requirement for proof becomes.

To determine which of the above sets of rules is correct, we can use the processes of reference, omission, and placement. Consider first (15), the hypothesis that AUX is part of SUBJECT. A well–known fact about English is that subjects and objects can be replaced with pronouns like they, them, she, her, etc. The use of pronouns is very common in language: by replacing a phrase with a pronoun we do not have to keep repeating the whole phrase. Instead of saying The stewardess told the passengers that the passengers had to obey the stewardess, we say The stewardess told the passengers that they had to obey her. Rules of reference tell us what they and her refer to. Furthermore, specific pronouns must be used in specific positions: subjects must be replaced with pronouns like I, he, she, we, they, etc., and objects must be replaced with pronouns like me, him, her, us, them, etc. Thus, alongside of The passengers must obey the stewardess, we have sentences like (18), but none like (19).

(18) a. They must obey her.
   b. She must obey them.

   b. *Her must obey they.

Following (15), we produce a fully grammatical sentence when we attempt to substitute the SUBJECT node, which contains the AUX, and the OBJECT node with the appropriate pronouns:

(20) a. [The passengers must] obey [the stewardess].
   b. [They] obey [her].

However, if the nouns in SUBJECT and OBJECT position of (15) are reversed as in (21a), then substitution of SUBJECT and OBJECT with pronouns produces the ungrammatical (21b).

(21) a. [The stewardess must] obey [the passengers].
   b. *[She] obey [them]. (cf. She obeys them).

The ungrammaticality of (21b) tells us that the analysis in (15) is wrong. If the rules were correct, then we would not get an ungrammatical sentence when we applied them in various circumstances. We therefore must reject (15). Intuitively, (15) seems incorrect for another reason. Subjects and objects appear to be the same kinds of phrase; yet, (15) claims that AUX is part of SUBJECT. Clearly, AUX can never be part of OBJECT: *They obey the stewardess must. If subjects and objects are the same kinds of phrase, we ought to be able to get AUX in either. As a result, we must reject (15) which means that our alternatives are (16) or (17). To help us choose between (16) and (17), let us consider the following data:
Generally the passengers must obey the stewardess.

*The generally passengers must obey the stewardess.
The passengers generally must obey the stewardess.
The passengers must generally obey the stewardess.
*The passengers must obey generally the stewardess.
*The passengers must obey the generally stewardess.
The passengers must obey the stewardess generally.

*Strictly the passengers must obey the stewardess.
*The strictly passengers must obey the stewardess.
*The passengers strictly must obey the stewardess.
The passengers must strictly obey the stewardess.
*The passengers must obey strictly the stewardess.
*The passengers must obey the strictly stewardess.
The passengers must obey the stewardess strictly.

These data indicate that there are two broad classes of adverbs in English: **SENTENCE ADVERBS** like generally that modify the whole sentence, and **MANNER ADVERBS** like strictly that modify the verb phrase. Only the diagram in (16) and the rules in (16b) capture this classification, that is, we arrive at a very efficient characterization of the two classes of adverbs with the following logic:

If the rules in (16b) specify sentence structure, then we can say that sentence adverbs occur around the three major sentential elements, namely, the four positions indicated by the pound sign as follows:

**SENTENCE** # SUBJECT # AUXILIARY # VERB PHRASE #

If the rules in (16b) specify verb phrase structure, then we can say that manner adverbs occur either at the beginning or the end of the verb phrase, namely, the two positions indicated by the pound sign as follows:

**VERB PHRASE** # VERB + OBJECT#

The diagram and rules in (17) do not lead to such an efficient characterization. In short, the **PLACEMENT** of adverbs proves what the units in sentences are. Furthermore, these rules predict that (25a) is grammatical, and that (25b) is not.

The passengers must generally strictly obey the stewardess.

*The passengers must strictly generally obey the stewardess.

There are sentences that corroborate the choice of (16). Notice that the VERB PHRASE node in (16a) is substantiated by its possible **OMISSION** in a sentence like The passengers must obey the stewardess if the pilot orders them to (obey the stewardess). If the VERB PHRASE included AUX, as in (17), then repetition of the VERB PHRASE would produce *The passengers must obey the
stewardess if the pilot orders them to must obey the stewardess. Again, following the rules logically we see that they are confirmed or rejected by the sentences that result, specifically whether the rules lead to other sentences that are grammatical or ungrammatical.

As final confirmation of (16), consider the use of do it in a sentence like The pilot told the passengers that they must obey the stewardess and actually had no trouble convincing them to do it (do it = obey the stewardess). Again, if the AUX were part of the VERB PHRASE, then do it would have to mean must obey the stewardess not obey the stewardess. Indeed, there is no pronominal form like do it in English that stands for a VERB PHRASE that contains an AUXILIARY. If one existed, we would have evidence supporting (17).

As a result of these considerations, we prove that English sentences contain three basic units; therefore, the analysis in (16) is justified. Stated this way, a grammatical description is not a matter of opinion. It is a matter of fact. Furthermore, we attain a very high level of adequacy by basing our description on the concept of phrase, since phrase structure is the result of chunking, and chunking is the result of biological constraints on human memory. We have a direct connection between the nature of man and the nature of grammar.

As we saw in the Chapter One, there are three levels of adequacy that a linguist can attain in grammatical analysis. The first level, called OBSERVATIONAL ADEQUACY, is attained when the facts are noted. The second level, called DESCRIPTIVE ADEQUACY, is attained when the facts are described with generalized principles or rules, e.g., (16). The third and highest level, called EXPLANATORY ADEQUACY, is attained when those principles are related to the nature of the language apparatus of man. As a linguist moves from observational to explanatory adequacy, an ever higher level of generality is reached. At the highest level, linguists begin to relate individual languages like English to human language in general and, therefore, to offer a real explanation for linguistic phenomena. In attempting to attain explanatory adequacy, a linguist is also able to separate out what is arbitrary and language specific, from what is predictable in terms of the nature of the human language apparatus (the brain and the vocal and auditory organs).

Over a period of many years, traditional grammar gave way to STRUCTURAL GRAMMAR because the latter could provide more descriptively adequate characterizations of natural language. Traditional definitions such as those in (12) have been replaced by PS–RULES like those in (16b).

Thus far, we have justified a model of English which contains tree structures like (16a). However, there are improvements that can be made to (16) that will allow us to attain a higher level of descriptive adequacy. Notice that any word or group of words that can be a subject of an English sentence can also be an object (with meaning change, of course):

(26)  a. John saw her.
      b. She saw John.

(27)  a. The new tenor from Italy met the members of the orchestra.
      b. The members of the orchestra met the new tenor from Italy.
(28)  a. That standards are low indicates that people are lax.
    b. That people are lax indicates that standards are low.

As these examples show, the same class of items can function as either the subject or the object. This class of items, usually referred to as **NOUN PHRASE** (NP), includes either a simple noun (N), e.g., John, a **PRONOUN**, e.g., she/her, a noun preceded by a determiner (DET) like the tenor, or a whole clause, e.g., that standards are low. None of this information is contained in a diagram like (16). Furthermore, a diagram such as (16) confuses functional and structural information.

A category like **VP** (VERB PHRASE) or **NP** is a **STRUCTURAL CATEGORY**. It abbreviates a class of syntactic structures that can occur in certain positions in a syntactic **HIERARCHY**. On the other hand, a category like subject or object is a **FUNCTIONAL CATEGORY**, which names what function or role a particular structure plays in the sentence. Thus, in (27a) and (27b), the new tenor from Italy is structurally a noun phrase (NP), consisting of the noun tenor preceded by the determiner the and the adjective new, and followed by the prepositional phrase from Italy; functionally, this NP is the subject of (27a) and the object of (27b).

This additional information about English syntax, and more specifically about the sentence in (13), can be expressed if the tree diagram in (16) is replaced with the one in (29), an entirely structural representation (S = SENTENCE; NP = NOUN PHRASE; VP = VERB PHRASE; N = NOUN; V = VERB):

(29)

To accommodate all the varieties of NP that occur in (26) through (28), we require the following **PS–RULE**, where the parentheses indicate **OPTIONAL ELEMENTS** and the braces (curly brackets) indicate **ALTERNATIVE ELEMENTS**:

(30)  \[
\text{NP} \in \{ \left( \text{DET} \right) \; + \; \left( \text{ADJ} \right) \; + \; \text{N} \; + \; \left( \text{PP} \right) \} \\
\text{PRONOUN} \; \text{S}
\]
The rule (30) says that an NP has basically one of three forms: a noun, preceded and followed by some optional elements; a pronoun; or a sentence. Thus, (30) is an abbreviation for all the rules in (31).

(31)  
\[
\begin{align*}
&\text{a. NP } \xi \text{ DET } + \text{ ADJ } + \text{ N } + \text{ PP} \\
&\text{b. NP } \xi \text{ DET } + \text{ ADJ } + \text{ N} \\
&\text{c. NP } \xi \text{ ADJ } + \text{ N } + \text{ PP} \\
&\text{d. NP } \xi \text{ DET } + \text{ N } + \text{ PP} \\
&\text{e. NP } \xi \text{ DET } + \text{ N} \\
&\text{f. NP } \xi \text{ ADJ } + \text{ N} \\
&\text{g. NP } \xi \text{ N } + \text{ PP} \\
&\text{h. NP } \xi \text{ N} \\
&\text{i. NP } \xi \text{ PRONOUN} \\
&\text{j. NP } \xi \text{ S}
\end{align*}
\]

Notice that the left to right order in PS–RULES is crucial: it expresses the fact that the NP in (32) are grammatical while those in (33) are not:

(32)  
\[
\begin{align*}
&\text{a. the new tenor from Italy} \\
&\text{b. the tenor} \\
&\text{c. tenors from Italy}
\end{align*}
\]

(33)  
\[
\begin{align*}
&\text{a. *the from Italy new tenor} \\
&\text{b. *tenor the} \\
&\text{c. *from Italy tenors}
\end{align*}
\]

Expanding our corpus, we allow for more complex verb phrases and auxiliary phrases such as those in (34).

(34)  
\[
\begin{align*}
&\text{a. He will not become lazy.} \\
&\text{b. They consider those acrobats awesome.} \\
&\text{c. John gave a fresh coat of paint to the house.} \\
&\text{d. They elected him chairman of the board.}
\end{align*}
\]
These new examples give us the set of PS–Rules (35).

\[(35) \]

a. \( S \xi \text{NP} + \text{AUX} + \text{VP} \)

b. \( \text{VP} \xi \text{V} + (\text{NP}) + (\{\text{NP}, \text{PP}, \text{AP}\}) \)

c. \( \text{PP} \xi \text{P} + (\text{NP}) \)

d. \( \text{NP} \xi \{ (\text{DET} ) + (\text{ADJ} ) + \text{N} + (\text{PP} ) \} \)

e. \( \text{AUX} \xi (\text{MOD}) + \text{TNS} + (\text{NEG}) \)

f. \( \text{TNS} \xi \{\text{PRS}, \text{PST}, \text{FUT}, \text{CND}, \text{IMP}\} \)

As before, the arrow in these rules is an instruction to rewrite the symbol to the left as the symbol or symbols to the right. Parentheses indicate optional constituents; braces indicate alternative constituents. The only function of the plus symbol in PS–RULES is to mark a clear separation of constituents; it is, therefore, optional. Note again that the left to right order of constituents is an entirely empirical matter; once a particular order is determined from an examination of possible phrase structures, it cannot be changed unless there is other evidence indicating that the change is justified. The rules in (35) are not a complete list of all the PS–Rules for English; for example, notice that adverbs are not included. These rules will be added to and modified as we proceed.

The symbol TNS stands for TENSE, which is used here as a special abbreviation for the various TIME and MODE distinctions in English. The five tenses in English include the three TIME distinctions, PRESENT (PRS), PAST (PST), and FUTURE (FUT), and the two MODE distinctions, CONDITIONAL (CND), and IMPERATIVE (IMP). Some of these distinctions are not realized as individual words, but as inflectional endings. A MODAL (MOD) is a word like can, could, shall, should, will, would, may, might, must, etc. These words are actually composite forms. In English, inflections aren’t always an identifiable element at the end of a word: they can appear as modifications of the root or as nothing at all. For example, will is the modal will in future time; would is the modal will in the conditional mode. The symbol NEG stands for NEGATIVE.

The name given to grammars formulated in terms of phrase structure rules and tree diagrams is called PHRASE STRUCTURE GRAMMARS; the theory behind them, as we have indicated, is called STRUCTURAL GRAMMAR. In developing a set of phrase structure rules like (35), a linguist will attempt to reach the highest level of generality possible, which means proposing rules that describe the greatest number of cases (out of the infinite number possible) in the simplest way. For example, postulating TNS as occurring after MOD and before V accounts most simply for did play (do PST play) and played (PST play). Considering only a sentence like they played, one might
conclude that an analysis which places TNS to the left of V is unnecessarily abstract. But remember, a grammar attempts to account for all possible sentences.

In addition to identifying all of the major constituents of a sentence and indicating how these constituents are related to each other, phrase structure grammars offer a formal way of formulating such functional notions as subject and object. Notice that in a tree diagram like (29) some of the nodes in the tree immediately dominate others, that is, are directly above them. For example, the S node immediately dominates an NP node, an AUX node, and a VP node; the VP node immediately dominates a V node and an NP node; and so on. Using this relationship of immediate dominance, one can define the subject of a sentence as the NP node which is immediately dominated by S, and the object as the NP node which is immediately dominated by VP. Similarly, the predicate can be defined as the VP immediately dominated by S, and the main verb can be defined as the V immediately dominated by VP.

Such formal definitions are preferable to definitions like those in (12) because they are explicit, i.e., they refer to specific entities standing in unique relationships. A definition like the direct object specifies the person or thing directly affected by the action defined in the verb, on the other hand, is not explicit and, therefore, raises many problems. For example, consider the direct objects in the following sentences:

(36) a. The man will burn the money.
    b. The man will earn the money.

Under phrase structure analysis, the sentences in (36) would be assigned to the constituent structure given in (37).

(37)

This tree characterizes the object NP of both (36a) and (36b) in the same way. A comparison of the following sentences indicates that this characterization is correct.

(38) a. How much money did the man burn?
    b. How much money did the man earn?

(39) a. The money was burned quickly.
b. The money was earned quickly.

If there were something different about the occurrence of the NP *the money* in (36a) and (36b), one would not expect them to behave in the same way. But, the sentences in (37) and (38), and many others, show that they are, in fact, the same.

Now, according to the definitions in (12), the NP *the money* in (36a) is the direct object because *it specifies the thing directly affected by the action defined in the verb*. This seems defensible. With regard to the NP *the money* in (36b), however, a problem arises, because it is difficult to conceive of *the money* as being directly affected by the action of *earning*. This problem becomes even greater for sentences like the following:

(40) Sue earned a bad reputation.

(41) John suffered a blow on the head.

Generally speaking, this problem always arises when one attempts to describe language on the basis of definitions like those in (12). Another example occurs with the definition usually given to nouns, i.e., a noun is the name of a person, place, or thing. This definition combined with (12) leads to statements like *A noun can be the name of a thing which is the topic of an expression*. Such statements reveal little about English sentence structure. On the other hand, a description of a category like noun, formulated in terms of phrase structure grammar, will explicitly separate those items which are nouns from those which are not. For this reason, most linguists have abandoned definitions like those in (12) in favor of more rigorous and formal ways of characterizing sentence structure, such as those afforded by phrase structure grammar.

### 3.3 TRANSFORMATIONAL GENERATIVE GRAMMAR

By themselves, phrase structure rules like (35) can describe a great number of the individual sentences that occur in languages; however, if our corpus is expanded to include more types of constructions, it appears that some relationships *between* sentences will not be able to receive adequate characterizations with phrase structure rules alone. For example, consider sets of English sentences like the following and note that each pair means basically the same thing:

(42) a. The city must burn this book.
    b. This book, the city must burn.

(43) a. The frightened cat ran under the bed.
    b. Under the bed, the frightened cat ran.

(44) a. He will never be very strong.
    b. Very strong, he will never be.
The construction illustrated in (42b), (43b), and (44b) is **TOPICALIZATION**, the placement of a phrase in sentence initial position for emphasis. Such examples rarely occur in isolation, which is why they sound somewhat strange. However, in context they are not unusual. For example, during a discussion of the books to be burned, (42b) would sound quite appropriate.

Students often claim that they would never utter topicalized phrases, but careful attention to language reveals that, in fact, they do. Further, whether one utters topicalized phrases or not is completely irrelevant. The fact is that such sentences are immediately understood by native speakers in context. Given this, the sentences become part of the corpus of data that a linguist must analyze. As our discussion of prescriptive versus descriptive grammar in Chapter One indicated, modern linguistics is concerned with describing what is possible, not what is considered correct.

These three pairs of sentences begin with phrases that occur before the NP subject phrase. In (42b), the subject phrase is preceded by another NP; in (43b), by a PP; and, in (44b), an AP (Adjective Phrase). We could accommodate these data by revising (35a) as follows:

\[ (45) \quad S \quad E \quad ( \{NP, PP, AP\} \quad + \quad NP \quad + \quad AUX \quad +VP \]

But this will not do for several reasons. First, the optional phrases at the beginning of (45) are understood as the complements of the verbs, that is, phrases that complete the meaning of the verbs. For instance, *this book* in (42b) is the object of *burn*. Our structural definition of object says that the object is the NP dominated by the VP. While this definition holds for (42a), it fails for (42b) because the initial NP of (45) is dominated by S. Furthermore, our structural definition of subject is now compromised. Given (45), there are now two NP’s dominated by S. Worse yet, if we adopt (45), the whole classification of English verbs comes to grief. Broadly speaking, there are two types of verbs in English: **TRANSITIVE VERBS** like *catch*, which must take a direct object; and, **INTRANSITIVE VERBS** like *die*, which never do:

\begin{align*}
\text{(46)} & \\
\quad & \text{a. John caught Bill.} \\
\quad & \text{b. *John caught.} \\
\text{(47)} & \\
\quad & \text{a. John died.} \\
\quad & \text{b. *John died Bill.}
\end{align*}

If, to account for (48), we allow transitive verbs to occur in VP without a following NP, we lose the distinction between transitives and intransitives.

\[ (48) \quad \text{Foul balls like that, no one can catch.} \]

Somehow, we must indicate that the initial phrases in (42b), (43b), (44b), and (48) are complements of the main verb. Since a phrase structure solution via (45) failed, another method must be sought.

PS–RULES generate tree structures with phrases in specific positions. Suppose that we now allow grammars to contain other rules that move elements from such positions to new positions, that is,
transform one structure into another. For example, suppose that, as before, the PS–RULES in (35) generate a structure like (49).

\[(49)\]

Now suppose a **TRANSFORMATIONAL RULE** moves the object NP to the front of the sentence leaving behind a **TRACE** (a kind of footprint) of that object in the form of a co–indexed NP. The result is (50), where "[e]" indicates the **EMPTY NP TRACE** designating the original home of the object.

\[(50)\]

This produces the sentence (51a) or, more accurately, (51b).

\[(51)\]

\[a.\] This book, the city must burn.
\[b.\] [NP, this book] the city must burn [NP, e]

A crucial point in the representation (51b) is that there really is a gap in the sentence at the point [NP, e]. When speakers hear a sentence that begins with a "displaced" object, they must wait for the gap in the sentence before they can assign an interpretation to that "displaced" phrase. Consider (52, 55).

\[(52)\]

\[a.\] This book, you absolutely must try to get your students to convince each other to read.
\[b.\] [NP, this book] you absolutely must try to get your students to convince each other to read [NP, e]
Given representations like the above, we can say that \([NP_1 e]\) is bound to \([NP_1 \text{this book}]\) via REFERENCE, not unlike the way pronouns are bound to their referents.

A grammar that contains transformational rules is called a **TRANSFORMATIONAL (GENERATIVE) GRAMMAR**. In such grammars, a sentence like (51a) is associated with two structures: the structure generated by the phrase structure rules, that is, (49); and the structure generated by the transformational rules, that is, (50). Technically, we say that phrase structure rules generate the **DEEP STRUCTURE** of sentences, and transformational rules generate the **SURFACE STRUCTURE**. Crucially, functional relations like subject and object are not altered by transformational rules.

### 3.4 A NOTE ON SCIENTIFIC INQUIRY

In the preceding sections, we discussed some attempts to develop an adequate theory of grammar beginning with traditional grammar and culminating in transformational grammar. Reviewing this, we can see how linguistics has been able to deepen and broaden its characterizations of human language in an effort to attain ever higher levels of adequacy. The search for descriptively and explanatorily adequate models of grammar continues today.

It is often dismaying to come to a discipline for the first time and find that it does not provide a succinct, unified, and fully justified theory. Linguistics is such a discipline; however, although there is no grammatcal theory which is championed by every living linguist, the issues today are quite clearly drawn, and so are the objectives of research. The discovery of the grammatical facts themselves is much more significant than the details of particular representations of those facts.

No matter what grammatical model is proposed, it must be able to provide a characterization of all sentences in such a way that it accounts for the native speaker’s knowledge of them. This involves, among other things, accounting for ungrammatical sentences in a principled way, that is, in a way which predicts that they will be ungrammatical. The facts to be accounted for are the same regardless of the theory invented to characterize them. The objective of the discipline is to provide a theory which will be consistent with the ever–expanding corpus of data. In this respect, linguistics is no different from any other science. Consider, for example, the study of celestial objects.

Astronomy is one of the oldest sciences. Even before 2000 B.C., crops were sowed according to the movements of the sun and moon. Modern theories of the universe which displace the earth from the center are due to Copernicus (1473–1543). There have been many modifications over the centuries even to the point that separate areas of inquiry or methodology have been identified like radio astronomy, astrophysics and spectroscopy. The discovery of pulsars, quasars, black holes, and other stellar phenomena has engendered modifications in existing theories of the universe. As our knowledge of the universe has expanded, the field of astronomy has expanded, and a number of distinct theories for a number of distinct issues have emerged, e.g., theories on the origin of the universe. In the process, the explanatory power of the combined theories has increased. The discovery of some new stellar phenomena never nullifies everything that precedes, that is, astronomy
does not begin again from scratch. Rather, existing theories are appropriately modified or, if the phenomena are not understood, left entirely unmodified despite apparent conflicts or inconsistencies. It is always possible that putative exceptions are not exceptions at all, only misunderstood cases.

People have been studying language almost as long as they have been speculating on the heavens. Terms like *verb* which form part of the theories described in this book were coined by ancient grammarians. However, it is only in the last fifty years or so that linguists have been concerned with many of the issues discussed in this book, in particular, those issues formulated here as the grammatical characterization problem and the grammatical realization problem.

In short, students of linguistics must understand that the demise of any one theoretical construct, even say, the transformational rule, does not mean that the theory of grammar takes a giant step backward. Quite the contrary occurs. As new data are discovered, new models of characterization are inevitable. The theory to be described at the conclusion of this chapter, the theory of *Residential Grammar*, is not a completely different theory of grammar from transformational grammar. Rather, there is a straight line evolution from traditional grammar to structural grammar to transformational grammar to residential grammar. During this evolution, the issues have become more clearly defined, and the characterizations have become more explanatorily adequate. More than anything else, this process and progress of scientific inquiry must be understood.

In our discussion, various approaches to grammatical characterization are adopted, discussed, and either discarded or maintained as our inquiry proceeds. To some, this may seem to be a waste of time. Why not ignore the historical perspective and just discuss the right analysis? The answer is quite simple: there is no right analysis. There is only the analysis which covers the known facts at the present time. Since our understanding of language is increasing all the time and analyses, consequently, can be expected to be falsified by newly discovered data, the most important thing to be learned is how to do grammatical analysis to begin with. This prepares students for the changes that are inevitable in so young an area of inquiry as formal linguistics. Therefore, our focus must be on the methods and objectives of linguistic inquiry. At every stage in this inquiry, we will formulate hypotheses and examine their consequences for the theory of language. This process of hypothesis development is common not just to linguistics, but to scientific method in general.
3.5 NONTRANSFORMATIONAL GENERATIVE GRAMMAR

As we noted in the previous sections, one theory of language that has very successfully described language is the theory of transformational generative grammar (TG), which was first articulated by Noam Chomsky in a manuscript *The Logical Structure of Linguistic Theory* in 1955. Since then, countless articles and monographs have appeared on TG, and the theory has undergone considerable revision. However, fundamental to all versions of TG is the argument that grammars of natural languages must contain two major types of syntactic rules: (i) phrase structure rules, which generate the abstract **DEEP STRUCTURE** of sentences and (ii) transformational rules, which generate the actual **SURFACE STRUCTURE** of sentences.

Deep structures are abstract structures: phrases often occupy different positions in deep and surface structures; further, deep structures often contain elements which do not appear in the surface structure at all, e.g., elements which are deleted by some transformational rule. For example, consider the surface sentences in (53).

(53)

a. I’ll buy the books that are available.
b. I’ll buy the books available.
c. I’ll buy the available books.

At one point in the history of TG, adjectives like *available* were derived from full clauses like *that are available* in (53a), called **RELATIVE CLAUSES**. The steps are outlined in (54).

(54)

a. Deep structure of NP with a relative clause:
   [NP the books [S the books are available ] ]

b. Application of Relative Clause Formation:
   [NP the books [S that are available ] ]

c. Application of Relative Clause Reduction:
   [NP the books available ]

d. Application of Modifier Shift:
   [NP the available books ]

This derivation seems to be a descriptively adequate way to account for the relationship among the variants in (53). However, it was soon realized that such a transformational analysis raised many problems. All adjectives cannot be derived from relative clauses, as the following examples illustrate:

(55)

a. He is a mere child.
b. *He is a child that is mere.

(56)

a. He is a real jerk.
b. *He is a jerk that is real.

Also, most adjectives cannot occur after the nouns they modify as in (53b). Consider these:

(57) a. That is an expensive house.
    b. *That is a house expensive.

(58) a. She is a French maid.
    b. *She is a maid French.

In contrast, some adjectives cannot undergo Modifier Shift:

(59) a. Look at all that garbage adrift in the canals!
    b. *Look at all that adrift garbage in the canals!

At this point, it is important to realize that the above facts are just that, facts. The data are not at issue; every native speaker knows that the b–examples in (52, 55) through (59) are ungrammatical. Moreover, it is inconceivable that each speaker has memorized that these particular examples are bad. Having never heard them before, the native speaker still knows they are ungrammatical. Therefore, it is not English that is the problem; English is a given which cannot be altered for the sake of theoretical convenience. The problem is the transformational analysis we have imposed on the data: (54) is simply the wrong way to look at the facts. At one point, in the history of TG, linguists did not realize this. As a result of studying the matter, they now do.

Recall that we added transformational rules to our descriptive apparatus as a result of the data in (42) to (44). The initial phrases in those examples have to be interpreted as complements of the main verb even though they are initial. We decided to generate the phrases in post–verbal complement position via the PS–Rules, and then move them to initial position via a transformational rule. Let us re–examine the matter. Consider again (42), repeated here as (60).

(60) a. The city must burn this book.
    b. This book, the city must burn.

We said that the deep structure of (60b) must be the same as the deep structure of (60a), namely, (61) (cf. (49)).
We then said that a transformational rule moved the post-verbal NP to the front of the clause leaving behind a trace (cf. (50)):

(62)

We assumed that the same derivation could account for (43) and (44), repeated here as (63) and (64), respectively.

(63)  
a. The frightened cat ran under the bed.  
b. Under the bed, the frightened cat ran.

(64)  
a. He will never be very strong.  
b. Very strong, he will never be.

The displaced phrase in (63b) is a PP; in (64b), an AP. Clearly, therefore, the rule that moves these phrases forward cannot be restricted to any one category of phrase. It must apply to NP, PP, and AP, among others. Transformational grammarians have called this rule "Move−" where "" is any phrase. Application of Move−" to a structure like (61) will produce (62). Suppose in contrast to this analysis that we allow empty phrases to be generated directly via the phrase structure rules, that is, suppose we allow a rule like (65) (cf. (35d)).

(65)  
\[
\text{NP} \notin \{ \text{(DET)} + (\text{ADJ}) + \text{N} + (\text{PP}) \} \\
\text{PRONOUN} \quad \text{S} \\
\left[\epsilon\right]
\]
With (65) and (45), we can directly generate (66) via the phrase structure component of grammar.

(66)

```
S
├── NP
│   ├── DET this
│   └── N book
├── NP
│   ├── DET the
│   └── N city
├── AUX
│   └── MOD must
├── TNS PRS
└── VP
    └── V burn
```

Therefore, we do not need transformational rules. What we need instead is a mechanism for relating [NP e] to full noun phrases like [NP this book], something that is needed anyway. Again, it is useful to stop at this point and take stock of what we are trying to accomplish. Native speakers of every language completely understand every possible sentence in their language. The sentence that you are now reading is a sentence which you have probably never encountered before in your life, and yet you understand it immediately as you read it. It must be that, at some unconscious level, you understand precisely the relationships we are trying to uncover. The number of sentences in every language is infinite; learning a language does not consist of memorizing a list of the possible sentences. Rather, it must consist of learning the principles upon which every possible sentence is constructed. These principles form native speakers’ unconscious knowledge of their language. Throughout this discussion, we have been trying to ascertain just what this knowledge is, that is, what must native speakers know to understand all the sentences we have been considering.

### 3.6 X–BAR SYNTAX

We saw in the last section that it might be possible to eliminate transformational rules from our descriptive apparatus. Doing so would change our entire conception of syntax. With transformational rules, we say that human languages cannot be adequately described without the following two assumptions:

(67)

a. Every sentence has two structural levels, an abstract underlying structure roughly equivalent to what is understood, and a real superficial structure roughly equivalent to what is heard.

b. The order of phrases in the abstract underlying structure can be different from the order of phrases in the real superficial structure.

It seems quite clear that (67a) must be assumed. The syntactic processes of REFERENCE, OMISSION, and PLACEMENT demand it. For example, there is no way to understand the superficial structure (68a) without the underlying representation (68b).

(68)

a. John will sing if you ask him to.
b. John will [VP sing ] if you ask him to [VP e ].

On the other hand, (67b) is not a necessary assumption, as we saw in the last section. That assumption is linked to transformational grammar. If we allow empty phrases to be generated directly via PS–Rules, then we can give up (67b).

The problem rests, as it always did (though we did not always realize it), on phrase structure. It appears that PS–Rules like those in (35) will become very complicated if we do not allow transformations, because there seem to be so many possible combinations of categories and positions. Recall that we needed to add (45). Clearly, something is wrong with our concept of category; we have a categorial problem.

Our entire discussion of syntax has pivoted around the concept of SYNTACTIC UNIT. To find these units, we considered the three syntactic processes of REFERENCE, OMISSION, and PLACEMENT. We have the following definitions:

(69) a. **PHRASE**: a word or group of words that functions as syntactic unit in REFERENCE, OMISSION, and/or PLACEMENT.

b. **HEAD**: the minimal element of a phrase.

A phrase whose head is a noun is a noun phrase; one whose head is a verb, a verb phrase; one whose head is a preposition, a prepositional phrase; and so on. The following are examples of noun phrases:

(70) those paintings

(71) all those paintings

(72) all those paintings of landscapes

(73) all those stolen paintings of landscapes

(74) all those stolen paintings of landscapes of the Louvre’s

(75) all those recently stolen paintings of landscapes of the Louvre’s

(76) all those ten recently stolen paintings of landscapes of the Louvre’s

(77) all those ten recently stolen Impressionist paintings of landscapes of the Louvre’s on sale

If we attempt to diagram the NP’s in (70) – (77) in accordance with the mechanisms we have so far developed for English phrase structure, we encounter a number of immediate problems. The most difficult one concerns the fact that both traditional and early transformational grammar provide only the most meager structural framework for basic syntactic units. Quite clearly, we cannot suspend
all the structures in (77), for example, from the same NP node. Such an analysis ignores the fact that NP’s have internal *hierarchical* structure as well as internal linear structure. To see this, consider the simple NP in (78) and its associated diagram provided by the rules we have developed so far.

(78)

```
NP
   /\  \\
   DET ADJ N
     those Spanish paintings
```

A diagram like (78) leaves a number of important facts unaccounted for. First, note that we have examples like (79).

(79)  

a. John saw those Spanish paintings, and Bill saw these Italian ones.  
b. John saw those Spanish paintings, and Bill saw these ____.

The word *ones* in (79a) substitutes for the noun *paintings* indicating that *paintings* is an internal unit within its own phrase. That fact is accounted for by (78b): *paintings* is under one node by itself, the N node. However, the same diagram cannot account for the gap in (79b). In this sentence, the gap stands for *Spanish paintings* which is not identified as a unit in (78b). For *Spanish paintings* to be a unit the two elements, the ADJ (*Spanish*) and the N (*paintings*), must be under one node, separate from the DET (*those*) node. This means that a better diagrammatic representation of (78a) is (80), where the "?" identifies the missing, as yet unlabeled, node.

(80)

```
NP
   /\  \\
   DET ADJ N
     those Spanish paintings
```

This deficit in the internal structure of phrases has not gone unnoticed in transformational grammar, and, in the 1970’s, a phrase structure framework was developed that ultimately came to be known as X–BAR SYNTAX. This theory replaces diagrams like (80) with ones like (81), in which progressively larger syntactic units of the same phrasal type are indicated by progressively higher numbers or primes (for example, N2 or N3 designates a larger unit than N1 or N3). In the original version of this theory, numbers and primes were not used; rather a bar was placed over a category like N. Since this is difficult to produce on most typewriters and printers, the bars have been replaced with numbers or primes.
Notice that, in (81), *Spanish paintings* is contained in a separate node labeled N1. This node represents a separate N level apart from N2 (the old NP) and N. The representation claims that phrases, in particular, noun phrases, must have more internal structure than the amount usually accorded them. One of the many examples that demands this is (79b) which contains a gap that stands for the unit *Spanish paintings*. The representation in (81) replaces the "?" of (80) with a new intermediate N level and, accordingly, directly accounts for the gap in (79b). Basically, X–Bar syntax recognizes more syntactic levels than the two traditionally recognized in transformational grammar (XP over X, that is, NP over N, VP over V, AP over A, PP over P, etc.).

Before continuing, a somewhat trivial matter, but one which seems to help students read complicated phrase structure diagrams, should be mentioned. In X–Bar notation, it is useful to line up all the head elements in a straight vertical sequence making location of the head straightforward. Thus, the representation of (81) is (82).

Returning to the main discussion, consider now a phrase like (83), which can mean either (84a) or (84b).

(83) those Spanish teachers

(84) a. those teachers who are Spanish  
b. those teachers of Spanish

In addition, we have the following examples:
(85)  a.  those Spanish Braille teachers  
     b.  *those Braille Spanish teachers  

(86)  a.  John saw those Spanish math teachers, and Bill saw these ________.
     b.  John saw those Spanish math teachers, and Bill saw these Italian ones.

These phrases require that compound nouns like *Braille teachers in (85a), *Spanish teachers in (85b), and math teachers in (86) be contained under a separate N node. Ignoring the internal structure of the modifiers for a moment, this gives us structures like the following:

(87)  (88)  

Observe that the compound nouns Braille teachers in (87) and math teachers in (88) are contained under one N1 node. Such representations account for the use of ones in examples like (86b). Observe also that these representations can account for the ambiguity of a phrase like (83). If it means (84a), then Spanish is a simple descriptive adjective and branches off N2; if it means (84b), then Spanish is part of a compound and branches off N1. Further, this analysis predicts that both should be able to occur together, and that is correct:  I met those Spanish Spanish teachers  is possible; where the first Spanish refers to origin, and the second refers to language.

We are now in a position to make a very important observation that will ultimately solve the categorial and transformational problems presented above in the TG framework.

Notice that the order of elements within an N3 is fixed: the determiners must precede the adjectives and the adjectives must precede the elements of compounds. Further, these modifiers occur (generally) to the left of the head. We have no examples like (89):

(89)  a.  *(John met) those math Spanish teachers.
     b.  *(John met) Spanish those teachers.
     c.  *(John met) teachers math Spanish those.
     d.  *(John met) Spanish teachers those.
Given these facts, there does not seem to be any reason to postulate the category DET apart from the category ADJ. One may view them both as modifiers of the head, determiners being modifiers suspended from N3, adjectives being modifiers suspended from lower levels. Thus, the key to generalizing our PS–Rules is to generalize our theory of syntactic category.

3.7 RESIDENTIAL GRAMMAR

Given the facts of the last section, suppose we re–examine the concept of syntactic category (part of speech). In past theories of grammar, these categories were viewed as atomic, that is, not composed of other elements. The data from the last section suggest that this is incorrect. Syntactic categories like DET and ADJ share characteristics much the way sounds share characteristics in phonology.

Feature theory is a standard part of phonological descriptions, as we saw in Chapter Two. For example, consider the following features:

\[(90)\]
\[
\begin{align*}
\text{a. } & [+\text{VOICED}] & \text{produced with vocal cord vibration} \\
\text{b. } & [-\text{VOICED}] & \text{not produced with vocal cord vibration}
\end{align*}
\]

\[(91)\]
\[
\begin{align*}
\text{a. } & [+\text{NASAL}] & \text{involving exhalation through the nose} \\
\text{b. } & [-\text{NASAL}] & \text{not involving exhalation through the nose}
\end{align*}
\]

\[(92)\]
\[
\begin{align*}
\text{a. } & [+\text{ANTERIOR}] & \text{articulated at the front of the mouth} \\
\text{b. } & [-\text{ANTERIOR}] & \text{not articulated at the front of the mouth}
\end{align*}
\]

Given these features, we can say that the sounds for \(m\) as is \textit{mass}, \(b\) as in \textit{bass}, \(p\) as in \textit{pass}, and \(g\) as in \textit{gas}, are as follows:

\[(93)\]
\[
\begin{align*}
\text{a. } & [m] & [+\text{VOICED}, +\text{NASAL}, +\text{ANTERIOR}] \\
\text{b. } & [b] & [+\text{VOICED}, –\text{NASAL}, +\text{ANTERIOR}] \\
\text{c. } & [p] & [–\text{VOICED}, –\text{NASAL}, +\text{ANTERIOR}] \\
\text{d. } & [g] & [+\text{VOICED}, –\text{NASAL}, –\text{ANTERIOR}]
\end{align*}
\]

Thus, a sound like \([m]\) is nothing more than an abbreviation for a specific set of phonological features. Let us propose a similar feature analysis for syntax.

Recall that the major motivation for this discussion has concerned example (60) on Page 106, and (63) and (64) on Page 107. In particular, the apparatus of TG was unable to make any significant cross–categorial generalizations, and, consequently, the necessary PS–Rules in a grammar without transformations became too numerous and clumsy to generalize (like (45)).

Essentially, the problem was and is that classical TG did not characterize the categories of language in broad enough terms. For instance, there are significant differences between verbs and all other
syntactic categories. For one thing, verbs tend to have much stricter positional options than other categories. For example, while NP, PP, and AP can occur in sentence initial position (see the discussion of TOPICALIZATION on Page 101), VP cannot:

(94) a. This book, the city must burn.
    b. Under the bed, the frightened child ran.
    c. Very strong, he will never be.

(95) a. *Have gone, John will.
    b. *Be fishing, all the men could.

In English, verbs are also the only category that carries tense, the only category that shows mode (may break) and aspect (has broken) distinctions, the only category that can occur in present and past participial form (breaking and broken), and so on. For these and other reasons to be discussed below, we make the following division:

(96) Syntactic Categories

```
All Verb Forms
  /\ VERBAL]
  \ / VBL]

All Nonverb Forms
  | VERBAL|
  | VBL|
```

The feature [+VBL] specifies those categories which are inherently marked for distinctions in tense, aspect, voice, and/or mode; [–VBL] specifies categories that are not so marked. [–VBL] categories also fall neatly into two major classes, those that behave like nouns, and those that do not. A distinctive attribute of nouns is that they are inherently marked for distinctions in number, person, gender, and/or case. In RG, the former are [+NML]; the latter, [–NML]. The same distinction occurs in verb forms. Verb forms that are inherently marked for nominal distinctions [+NML] include verbal nouns like the gerund basing in Basing the argument on so many assumptions is unwise; verb forms that are not inherently marked for nominal distinctions include tensed verbs like base in They base their argument on many assumptions, in which the plural number on base is a result of agreement and is not an inherent feature of the tensed verb (cf. He bases his argument on many assumptions). To capture these distinctions, we modify (96) to (97), and refer to nonverbs as ADJUNCTS since they freely occur in a wide variety of embedded structures and nonnouns as CHARACTERIZERS since they characterize a head.
[++NML] categories differ from characterizers in a number of ways. First, [++NML] categories have a number of morphological specifications that characterizers lack. They occur before specific suffixes like –ment, –ness, –ing, etc. (basement, baseness, basing). They show number distinctions: base versus bases. They occur in the possessive: the base’s shape and the shape of the base. Second, [++NML] categories fulfill a number of specific syntactic functions, which means they occupy specific positions in syntactic hierarchies. For example, they can be SUBJECT or OBJECT. Third, [++NML] categories are always distributed before [–NML] categories on every X level in both prehead and posthead positions. Notice that in every diagram in this monograph, when two categories are suspended from the same level, [++NML] categories (NOUNS) always precede [–NML] categories (CHARACTERIZERS and VERBS).

We now have four major syntactic categories in language, which RG specifies as follows:

    b. Nouns (N): [–VBL, +NML] woman, women, she, all
    c. Characterizers (C): [–VBL, –NML] happy, happily, probably, on, after

Given these major categorial distinctions, we note that many parts of speech are distinguished from each other mainly by what kind of phrase they can occur in and where they can occur within that phrase, that is, they have a specific residence. Formally, we define a RESIDENCE as a specific position in syntactic structure which has a specific semantic or syntactic function.

The morphosyntactic feature oppositions [±VBL, ±NML] are not sufficient to distinguish the major syntactic categories that occur in the world’s languages. For example, within the category verb, there are subclasses which include finite verbs, nonfinite verbs (infinitives, participles, etc.), auxiliaries, and modals. Within the category characterizer, there are prepositions, subordinators (subordinating conjunctions), adjectives, adverbs, determiners, and so on. To specify these subclasses, we will use two features [±OPEN PHRASE] ([±OPH]) and [±OPEN CLASS] ([±OCL]) defined as follows:

(99) a. [+OPH]: occurring as the head of a phrase that freely contains other elements
    b. [–OPH]: occurring as the head of a phrase that does not freely contain other elements
The syntactic feature specification \([\pm \text{OPH}]\) separates categories whose internal phrase structure is open in the sense that it can freely contain specifiers (words like \textit{the}, \textit{this}, and \textit{that}), quantifiers (words like \textit{all}, \textit{some}, and \textit{much}), or modifiers (adjectives and adverbs), from other categories whose internal phrase structure is highly restricted. The \([\pm \text{OPH}]\) distinction is most clearly seen in the variety of structures possible for common nouns on the one hand, which can be specified, quantified, and modified, and pronouns and proper nouns on the other hand, which cannot:

(101)  
a. That very old woman left early./*That very old she left early.  
b. All the tall women walked in./*All the tall they walked in.  
c. A woman that is tall will get the job./*Mary that is tall will get the job.

The feature \([+\text{OCL}]\) specifies those categories which form an open class to which an unlimited number of items may be added. Since classical antiquity, most grammarians have observed the sharp distinction between the very large number of nouns, verbs, adjectives, and adverbs that occur in languages as opposed to the rather small fixed number of prepositions, conjunctions, determiners, pronouns, etc. The opposition \([\pm \text{OCL}]\) is intended to capture this dichotomy. For the most part, in English, open class words are marked by distinct inflectional suffixes: nouns show variations in number (\textit{boy, boys}); verbs show variations in tense (\textit{plays, played}); and adjectives and adverbs show variations in comparison (\textit{fast, faster, fastest; long, longer, longest}). Examples of \([+\text{OCL}]\) and \([–\text{OCL}]\) categories are the following:

(102)  
a. \([+\text{OCL}]\): nouns, verbs, adjectives, adverbs  
b. \([–\text{OCL}]\): auxiliaries, modals, pronouns, determiners, prepositions, etc.

Within a particular kind of phrase, certain categories are restricted to X3 level, others to X2 level, and still others to X1 level. For example, all categories denoting specification (DETERMINERS) or quantification (QUANTIFIERS) are X3 Level residents. All descriptive modifiers of the head are X2 Level residents. All elements of compounds (\textit{history in history teacher}) and complements (\textit{history in teacher of history} and \textit{teach history}) are X1 Level residents. Therefore, with reference to the X hierarchy, we recognize the following level features:

(103)  
a. \([+\text{X3L}]\) can freely occur immediately dominated by X3 (N3, V3, or C3)  
b. \([–\text{X3L}]\) cannot freely occur immediately dominated by X3 (N3, V3, or C3)

(104)  
a. \([+\text{X2L}]\) can freely occur immediately dominated by X2 (N2, V2, or C2)  
b. \([–\text{X2L}]\) cannot freely occur immediately dominated by X2 (N2, V2, or C2)

(105)  
a. \([+\text{X1L}]\) can freely occur immediately dominated by X1 (N1, V1, or C1)  
b. \([–\text{X1L}]\) cannot freely occur immediately dominated by X1 (N1, V1, or C1)
We note further, that some categories are restricted to phrases with specific heads, that is, can be
suspended from some X level only when X is a specific phrase type. DETERMINERS can only
occur in noun phrase, suspended from N3; ADJECTIVES can occur in either noun phrases or verb
phrases, suspended from N2 or V2; MANNER ADVERBS can occur only verb phrases suspended
from V2. Therefore, we recognize the following environment features:

(106) a. [+ENH] can freely occur immediately dominated by N3, N2, or N1
b. [–ENH] cannot freely occur immediately dominated by N3, N2, or N1

(107) a. [+EVH] can freely occur immediately dominated by V3, V2, or V1
b. [–EVH] cannot freely occur immediately dominated by V3, V2, or V1

(108) a. [+ECH] can freely occur immediately dominated by C3, C2, or C1
b. [–ECH] cannot freely occur immediately dominated by C3, C2, or C1

Lastly, we recognize that some categories are restricted to prehead position (DETERMINERS) and
others to posthead position (NEGATIVES). We, therefore, add these feature oppositions:

(109) a. [+PRH] can freely occur before the head of a phrase
b. [–PRH] cannot freely occur before the head of a phrase

(110) a. [+PSH] can freely occur after the head of a phrase
b. [–PSH] cannot freely occur after the head of a phrase

Now that we have most of the feature inventory from RG, we are able to eliminate many movement
transformations. For example, consider again the derivation of available repeated here (see (54) on
Page 105):

(111) a. Deep structure of NP with a relative clause: the books [S the books are available ]
b. Application of Relative Clause Formation: the books [S which are available ]
c. Application of Relative Clause Reduction: the books available
d. Application of Modifier Shift: the available books

As we saw, there are many difficulties with this derivation. Some adjectives cannot come from
relative clauses (112a), some adjectives cannot undergo Modifier Shift (112b), others must (112c),
and so on.

(112) a. a mere boy ( < *a boy who is mere)
b. *the adrift wood
c. *the television new

(111) was invented to account for the relationship among the examples given there; however,
because of problems like (112), it had to be abandoned. In RG, we can directly account for the
relationship between examples like the available books and the books available as in (113).
 SUCH DIAGRAMS OMIT UNBRANCHING INTERMEDIATE X LEVELS, BY CONVENTION. Thus, N2 is present because it branches; but N1, not relevant here, is omitted. If the phrases were the available history books and the history books available, then both N2 (dominating available) and N1 (dominating history) would be present in the diagrams.

In addition, individual levels must be recursive to distinguish units: [N3 the [N2 intelligent [N2 young [N men]]]] contrasts with [N3 the [N2 young [N2 intelligent [N men]]]]. In both of these examples, there are two successive, separate N2 levels distinguishing the meanings. In the first case, [N3 the [N2 intelligent [N2 young [N men]]]], one is talking about the young men who are intelligent. But in the second, [N3 the [N2 young [N2 intelligent [N men]]]], one is taking about the intelligent men who are young.

This method of recursion is also necessary to account for the use of ones in sentences like John met the young men from Cleveland, and Bill met the old ones, where ones refers to the subunit men from Cleveland. Such examples contrast with others like John met the young men from Cleveland, and Bill met the ones from New York, where ones refers to the subunit young men.

Since all categories on the X2 Level are modifiers of the head, it no longer matters whether the adjective precedes the noun or follows it. Therefore, we do not need a rule to transform one into the other. Further, the idiosyncratic facts of (112), which caused such problems for the transformational analysis in (111), are stated in the lexicon next to each lexical entry. This means that the word available has a dictionary specification like [–VBL, –NML, +X2L, +PRH, +PSH] meaning that it is an X2 Level characterizer (Adjective) that can occur in either prehead or posthead position.

We can extend this analysis to show the relationship between a courageous man and a man of courage as in (114) and a Braille teacher and a teacher of Braille as in (115).
The structure of *courage* in (114b) is called a genitive of quality; notice that, as an X2 Level element it serves as a modifier of the head, exactly like the adjective *courageous* in (114a). The structures in (115) show the relationship between compounds and complements. In English, this is most clearly seen in nouns, although it exists for other categories like verbs (*bartend* versus *tend bar*) and adjectives (*life supporting* versus *supporting life*).

The symbol "Ø" in (114b) represents a phonologically null DETERMINER which occurs in English before common mass nouns like *courage* and common plural count nouns like *women*. This null determiner is a feature of most grammatical descriptions of English, including traditional ones (see Quirk et al. 1985). It is posited to distinguish common nouns, which ordinarily do have determiners (*the cake, the cakes* versus Ø *cake, Ø cakes*), from proper nouns (*John, Detroit*, etc.), pronouns (*he, someone*, etc.), and quantifiers (*all, many*, etc.), which do not. The reasons for postulating Ø will be discussed in greater detail in Chapter Five.

The *of* in (114) and (115) is not a full preposition introducing a prepositional phrase. Actually it is little more than a phonological filler necessary in English to separate the head from posthead
modifiers. In English, the last noun in a sequence of nouns is the head of the phrase and the only one which can carry a number distinction. Consider these examples:

(116) a. the student teacher of language
    b. the student teacher of languages
    c. the student teachers of language
    d. the student teachers of languages

(117) a. the language student teacher
    b. *the languages student teacher
    c. the language student teachers
    d. *the languages student teachers

(118) a. *the students teacher of language
    b. *the students teacher of languages
    c. *the students teachers of language
    d. *the students teachers of languages

Crucially, if the plural students in (118) is changed to a possessive student’s the examples become grammatical. Again, in a straight sequence of nouns, it is only the last which carries number, barring a few exceptions (women delegates).

As these structures clearly indicate, the concept of RESIDENCE in RG enables us to eliminate many transformational derivations. Ultimately, residence is linked, of course, to the syntactic features of RG. These are proposed as substantive syntactic universals, meaning that the languages of the world must construct their syntactic inventories out of these features, just as they must construct their phonological inventories out of substantive phonological features. Despite this constraint, it is important to note that the theory does not demand that all languages choose the same features in the same combinations. Quite the contrary occurs. Different languages select different sets of features out of the pool of possible features, and even the same language, at different points in its history, utilizes features in different ways. For example, at an earlier stage of English, word order constraints were less stringent than they are today; therefore, the features [±PREHEAD] and [±POSTHEAD] did not have the significance they have in modern English. The task of children acquiring a language is to discover which system they have been exposed to by chance.

Given the above description of the English N3, we would like to generalize it to V3, to account for the very large number of nominals that are related to verbs, e.g., destruction and destroy, evolution and evolve, advancement and advance, shipment and ship, etc. This is essential if we are to generalize notions like subject–of and object–of across categories: we want to be able to relate the N3 his insistence on that to the V3 he insisted on that, the N3 her unexpected refusal to comply to the V3 she unexpectedly refused to comply, and so on.

If we equate the S node of TG with the V3 node of RG, we can generalize the structure of noun phrases (N3) and sentences (V3), one of the unrealized objectives of X–Bar syntax in the TG
framework. This will allow us to generalize syntactic relations across categories. To see this, consider the following diagrams.

(119) The Mafia illegally shipped drugs into the country during June.

(120) the Mafia’s illegal shipments of drugs into the country during June...
The characterizations in (119) and (120) make significant improvements over the TG framework in the search for descriptive adequacy. For example, notice that such characterizations as the above make possible a generalized statement of subject and object. The subject N3 \((\text{the Mafia})\) has the same relationship to the V3 head \(\text{ship}\) in (119) as it has to the N3 head \(\text{shipment}\) in (120). Similarly, the object N3 \((\text{drugs})\) has the same relationship to both V1 in (119) and N1 in (120); the adverb \(\text{illegally}\) is in the same relationship to \(\text{ship}\) as the adjective \(\text{illegal}\) is to \(\text{shipment}\). In short, the RG framework goes a long way in solving the problems in previous discussions.

In (119), \(\text{PST}\) is the morpheme for the past tense discussed earlier (see Page 98). Thus, TENSE markers in V3 occupy the same residence as DETERMINERS and POSSESSIVES in N3. In (120), POS stands for the possessive suffix, which is usually either [s] as in \(\text{book's (the book's cover)}\), [z] as in \(\text{John's (John's son)}\), or \([\text{Cz}]\) as in \(\text{Bess's (Bess's boss)}\). Notice that, in forming a possessive like \(\text{Mafia's}\), the noun \(\text{Mafia}\) is under the N3 and POS is under the C3. This is necessary because English contains expressions like \(\text{the boy with the stick's hand is sore}\), where the possessive phrase consists of the N3 \(\text{the boy with the stick}\) followed in a separate node by the possessive suffix. Notice that we do not say \(*\text{The boy's with the stick hand is sore}.*\)

With these improvements over TG, we are able to represent a complex example like (77) as follows:

(121) all those ten recently stolen Impressionist paintings of landscapes of the Louvre’s on sale
The complete RG morphosyntactic feature matrix is summarized in Figure Eight. Elsewhere in this text, syntactic categories are often referred to using the following abbreviations:

<table>
<thead>
<tr>
<th>Category</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>VERB</td>
</tr>
<tr>
<td>AUX</td>
<td>AUXILIARY</td>
</tr>
<tr>
<td>MOD</td>
<td>MODAL</td>
</tr>
<tr>
<td>N</td>
<td>NOUN</td>
</tr>
<tr>
<td>PRO</td>
<td>PRONOUN</td>
</tr>
<tr>
<td>QNT</td>
<td>QUANTIFIER</td>
</tr>
<tr>
<td>ADJ</td>
<td>ADJECTIVE</td>
</tr>
<tr>
<td>ADV</td>
<td>MANNER ADVERB</td>
</tr>
<tr>
<td>PPN</td>
<td>PREPOSITION</td>
</tr>
<tr>
<td>SCJ</td>
<td>SUBORDINATING CONJUNCTION; SUBORDINATOR</td>
</tr>
<tr>
<td>CCJ</td>
<td>COORDINATING CONJUNCTION; COORDINATOR</td>
</tr>
<tr>
<td>CPL</td>
<td>COMPLEMENTIZER</td>
</tr>
<tr>
<td>DET</td>
<td>DETERMINER</td>
</tr>
<tr>
<td>DGR</td>
<td>DEGREE WORD</td>
</tr>
</tbody>
</table>

One of the most significant advantages of the above framework is that it enables us to state the formal universal (122), which has gone unnoticed in TG because of the lack of refinement in its associated phrase structure:

(122) [+NML] categories must precede [–NML] categories in both prehead and posthead position on every X level.

Given the matrix in Figure Eight, the potential difficulty of constructing a revealing set of phrase structure rules is solved. All possible phrase structure sequences in English are reducible to one PHRASE STRUCTURE FILTER (PSF), namely, (123a) which is equivalent to the tree in (123b).

(123) a. \[X^n \ ( [+NML] ) ( [–NML] ) X^m ( [+NML] ) ( [–NML] ) \]

where \( m \neq n \)

b. \[
\begin{array}{ccc}
X^n & \quad & X^m \\
 N & | & N \\
 C \text{ or } V & | & C \text{ or } V \\
\end{array}
\]

(123) asserts that each X level must dominate a lower X level with an equal or lesser numerical value, e.g., X2 over X2, X1, or X0 but not X2 over X3. Further, (123) asserts that each X level may have at most one [+NML] and one [–NML] category, in that order, to the right and/or to the left of the head X. Given (123), we have solved the categorial problem, and can eliminate from our grammar complex and unrevealing PS–Rules like those in (35) and (45).
## FIGURE EIGHT: FEATURES FOR ENGLISH MORPHOSYNTACTIC CATEGORIES

<table>
<thead>
<tr>
<th>CATEGORIES &amp; EXAMPLES</th>
<th>VBL</th>
<th>NML</th>
<th>OPH</th>
<th>OCL</th>
<th>PRH</th>
<th>PSH</th>
<th>ENH</th>
<th>EVH</th>
<th>ECH</th>
<th>X1L</th>
<th>X2L</th>
<th>X3L</th>
</tr>
</thead>
<tbody>
<tr>
<td>VERB: go, goes, went</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>AUX: have, has, had</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>MODAL: can, could, must</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NOUN: boy, milk, Mary</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>PRONOUN: she, he, herself</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>QUANTIFIER: all, both, half</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>DETERMINER: a, the, this</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-   +</td>
</tr>
<tr>
<td>COMPLEMENTIZER: that, if</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>DEGREE WORD: so, too, this</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>PREPOSITION: in, out, after</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>SUBORDINATOR: since, after</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>COORDINATOR: and</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>ADJECTIVE: happy, big</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>MANNER ADVERB: happily</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>SENTENCE ADVERB: probably</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

| VBL: VERBAL | inherently marked for distinctions in tense, aspect, voice, and/or mode |
| NML: NOMINAL | inherently marked for distinctions in number, person, gender, and/or case |
| OPH: OPEN PHRASE | occurring as the head of a phrase that freely contains other elements |
| OCL: OPEN CLASS | unlimited in number |
| PRH: PREHEAD | can freely occur before the head of a phrase |
| PSH: POSTHEAD | can freely occur after the head of a phrase |
| ENH: ENVIRONMENT OF N | can freely occur immediately dominated by N3, N2, or N1 |
| EVH: ENVIRONMENT OF V | can freely occur immediately dominated by V3, V2, or V1 |
| ECH: ENVIRONMENT OF C | can freely occur immediately dominated by C3, C2 or C1 |
| X1L: X1 LEVEL | can freely occur immediately dominated by X1 (N1, V1, or C1) |
| X2L: X2 LEVEL | can freely occur immediately dominated by X2 (N2, V2, or C2) |
| X3L: X3 LEVEL | can freely occur immediately dominated by X3 (N3, V3, or C3) |
(123) also makes clear the relationship between a tree diagram such as (123b) and an equivalent, linear representation such as (123a), referred to as **LABELED BRACKETS**. For example, the following representations are equivalent (note that labeled brackets always occur in left–right pairs as the arrows indicate):

(124)

```
 a. [V3 [N3 he] [C3 PST] [V1 [v0 leave] [N3 her]]]
 b. 

```

Note that *her* is the object of *leave* and is part of V1. As before, PST + *leave* = *left*. Labeled brackets are difficult to read and, therefore, often simplified. For example, 

```
 [N3 he] above is technically [N3 [N0 he]]; however, since the internal structure of the noun phrase is clear, it is given in simplified form. If only the V1 is important to a discussion, the above might even be simplified to [V3 he PST [V1 leave her]].
```

(125)

```
 a. [V3 [N3 he] [C3 PST] [V2 [V0 leave] [C3 happy/happily]]]
 b. 

```

Note that *happy/happily* is a modifier of the predicate *leave* and is part of V2 (the distinction between X1 and X2 is discussed further on the next page).
As the above diagrams show, the most significant difference between RG and other versions of X–Bar syntax is the level distinctions, in particular, the status of the X2 level. In all phrases, the X2 level contains descriptive modifiers of the head. These may be either characterizers or nouns; compare (126a) and (126b).

(126) a. a courageous act b. an act of courage.

In V3, the V2 level dominates manner adverbs and, in copulative constructions, predicate modifiers of the subject:

(127) a. He acted courageously. b. He was courageous.

The parallelism between V2 and N2 can be seen in the following representations:

(128) a. It smells bad. b. It has a bad smell. c. Its smell is bad.
The need for three X levels above the head X proceeds from the following assumptions we have made all along:

(129) a. The rules of language are structure dependent, that is, they refer to structural units or phrases.

b. The rules refer to whole phrases, not pieces of phrases. In terms of a tree diagram, this means that rules make reference to nodes.

Given (129), consider the RG structure for this young history student:

(130)

```
  N3
   \   /
   C3  N2
   |   /  \
   C0  \   /
   this N1
      \   /
       C3  \
       C0  \
       young
       /  \
      /   
     N3
    /  \
   /   
history student
```

Verification of each level proceeds as follows:

(131) a. The entire phrase (the whole N3) is replaced in the sentence This young history student said that he would pass. (he = this young history student)

b. The anaphor one can occur with N2 elements: John met this young history student, and Mary met that one. (one = young history student)

c. Conversely, one cannot occur with N1 elements: *John met a history student, and Bill met a biology one. (one = student)

The need for the distinction between N2 and N1 is confirmed by a phrase like the Spanish Spanish teacher. Without two levels below the, there would be no way to disambiguate the senses of Spanish. The first one means from Spain; the second, of Spanish. Thus, the phrase equals the teacher of Spanish from Spain (compare (132a) and (132b)).
Residency requirements for this phrasal architecture predict the grammaticality of (133a) and (133b), and the ungrammaticality of (133c) and (133d).

(133) a. the French math teacher  
   b. the teacher of math from France  
   c. *the math French teacher  
   d. *the teacher from France of math

In addition, these structures account for the ambiguity of phrases like the practical nurse, an intellectual historian, and the issue of student grants. All of these facts result from the following residency requirements of English: Descriptive modifiers of the head must hang from X2; elements of compounds and complements must hang from X1.

Lastly, observe that this system allows the first member of a compound noun to be any one of the three major syntactic categories: in math teacher the noun head (teacher) is preceded by another noun (math); in physical therapist the head noun (therapist) is preceded by a characterizer (physical); and, in go cart, the head noun (cart) is preceded by a verb (go).
The three level hypothesis for V3 can be confirmed with reference to the following structure:

(134) Sue will get the mail on Monday.

Given (129), verification of the three V nodes proceeds as follows:

(135) a. The existence of the V3 level is indicated by its pronominalization in the following sentence: Sue will get the mail on Monday; at least, that’s what Bill says. (that = Sue will get the mail on Monday)

b. The existence of the V2 level is indicated by its omission in the following sentence: Sue will get the mail on Monday, and Mary will ___ too. (get the mail on Monday is left out.)

Further, V2 level elements can occur after the pro–form do so as in the following: Sue with get the mail on Monday, and Mary will do so on Tuesday. (do so = get the mail)

c. The existence of the V1 level is indicated by its omission in the following sentence: Sue will get the mail on Monday, but Mary won’t ___ till Tuesday. (get the mail is left out.)

Further, V1 elements can NOT occur after the pro–form do so as the following indicates: *Sue will get the mail on Monday, and Mary will do so the pay checks on Tuesday.

The existence of V1 (direct object and object complement position) as opposed to V2 (predicate nominative position, referring back to subject) also resolves the ambiguity in (136).
(136)  a.  John left the house messy.

(i)  *messy* an object modifier:

\[
[v_3 [n_3 \text{John}] [c_3 \text{PST}] [v_2 [v_1 [v_0 \text{leave}] [n_3 \text{the house}] [c_3 \text{messy}] ] ] ]
\]

(ii)  *messy* a predicate adjective, subject to agreement rules:

\[
[v_3 [n_3 \text{John}] [c_3 \text{PST}] [v_2 [v_1 [v_0 \text{leave}] [n_3 \text{the house}] [c_3 \text{messy}] ] ] ]
\]

b.  John defied Bill to get even.

(i)  *to get even* a complementary infinitive with subject *Bill*:

\[
[v_3 [n_3 \text{John}] [c_3 \text{PST}] [v_2 [v_1 [v_0 \text{defy}] [n_3 \text{Bill}] [c_3 \text{to get even}] ] ] ]
\]

(ii)  *to get even* a purposive infinitive with subject *John*:

\[
[v_3 [n_3 \text{John}] [c_3 \text{PST}] [v_2 [v_1 [v_0 \text{defy}] [n_3 \text{Bill}] [c_3 \text{to get even}] ] ] ]
\]
c. The boys made good models.

(i) *make* a transitive verb like *build*:

\[ \text{[V3 [N3 the boys] [C3 PST] [V2 [V1 [V0 make] [N3 good models]]]]} \]

(ii) *make* a copulative verb like *become*:

\[ \text{[V3 [N3 the boys] [C3 PST] [V2 [V1 [V0 make] [N3 good models]]]]} \]

In addition, the V1/V2 distinction explains the grammaticality of (137), and predicts the ungrammaticality of (138).

(137) a. John ate the food raw, nude.
   b. John left the house unlocked, drunk as a skunk.

(138) a. *John ate the food nude, raw.
   b. *John left the house drunk, unlocked.

The V1/V2 distinction also accounts for the ambiguity of sentences like those in (139):

(139) a. They left good friends.
   b. They left the country great men.
   c. They considered the candidates very concerned about the future of the country.

The most striking feature of these examples is the parallelism between the N1/N2 distinction and the V1/V2 distinction, clearly seen in the following:

(140) a. a young math teacher

\[ \text{[N3 [C3 a] [N2 [C3 young] [N1 [N3 math] [N0 teacher]]]]} \]

b. a teacher of math that young (is rare)

\[ \text{[N3 [C3 a] [N2 [N1 [N0 teacher] of [N3 math]] [C3 that young]]]} \]

c. He taught math young.

\[ \text{[V3 [N3 he] [C3 PST] [V2 [V1 [V0 teach] [N3 math]] [C3 young]]]} \]

(141) a. a superb math teacher

\[ \text{[N3 [C3 a] [N2 [C3 superb] [N1 [N3 math] [N0 teacher]]]} \]

b. a teacher of math that superb (is rare)

\[ \text{[N3 [C3 a] [N2 [N1 [N0 teacher] of [N3 math]] [C3 that superb]]]} \]

c. He taught math superbly.

\[ \text{[V3 [N3 he] [C3 PST] [V2 [V1 [V0 teach] [N3 math]] [C3 superbly]]]} \]
3.8 COMMAND RELATIONS IN PHRASE STRUCTURE

We are now in a position to formalize relationships like SUBJECT and OBJECT and to account for so-called displaced phrases. Consider first (61) recast with the RG innovations as (142).

(142)

In a diagram like (142), it is possible to follow a path from one X category to another. Some paths prove to be crucial in determining syntactic relationships. One particularly useful relationship in syntax is the C–COMMAND (for CATEGORY COMMAND) relationship, which we define as follows:

(143) A node " C–commands a node $ if the node immediately above " dominates $.

Applying (143) to the diagram in (142), we see that the N3 the city C–commands the verb burn because the node immediately above that N3 is the top V3 node and that top V3 node dominates the verb burn. Similarly, the N3 this book C–commands burn because the node immediately above that N3 is the V1 in the diagram and that V1 dominates the verb burn.

As we will see in Chapter Five, this relationship is at the basis of all the rules for finding the referents of pronouns in English. For now, we will use it to formally define the functional notions subject–of and object–of:

(144) a. The subject of some node $ is the N3 which most immediately C–commands and precedes $.

b. The object of some node $ is the N3 which most immediately C–commands and follows $.

The phrase most immediately means ‘is closest to’ or ‘is separated by the fewest number of intervening nodes in the tree.’
Given (143) and (144), we determine the subject and object of a verb such as the one diagramed in (142) as follows:

(145)  
   a. The N3 above city C–commands and precedes the verb burn. The N3 is "; the V0 node burn is $; the node immediately above ", which is the topmost V3 in the diagram, dominates $. Since " precedes $, " (the city in this example) is the subject of $ (burn).

   b. The N3 above book C–commands and follows the verb burn. The N3 is "; the V0 node burn is $; the node immediately above ", which is V1, dominates $. Since ", which is to the right of $, " (this book in this example) is the object of $ (burn).

The same definitions will work for all the other relevant diagrams in this text. For example, The Mafia is the subject and drugs the object of ship in (119) and shipment in (120); and Sue is the subject and mail the object of get in (134).

In accordance with preceding discussion (see (65) for example), RG permits the terminal nodes of (123) to dominate two kinds of empty categories, that is, categories that are phonologically null: [u], which is an understood element in a sentence like Let’s eat [u]; and [e], which is a bound ANAPHOR, that is, an item that requires a referent. The availability of [e] together with (143) will account for the interpretation of so–called displaced constituents. Consider again (66) recast with the RG innovations as (146).

(146)

As in (142), city is the subject of burn. Importantly, book is not the subject. Although the N3 above book C–commands burn, it does not immediately C–command it. The N3 above city is closer.
In (146), the empty N3 most immediately C–commands and follows *burn*, so it is the object; however, it is also an anaphor, so it must have a referent. To find the referent, we use the following concepts.

(147) **IMMEDIATE NEIGHBORHOOD**: An immediate neighborhood embraces all phrases that are dominated by the first X3 above an X3 level prehead characterizer (DET or POS in N3; CPL or TNS in V3).

(148) **EXTENDED NEIGHBORHOOD**: An extended neighborhood embraces all X3 recursions above the immediate neighborhood.

(149) **THE EMPTY CATEGORY CONDITION (ECC)**: An empty anaphor [X3 e] within some immediate neighborhood must be bound to a V3 Level phrase of the same type in the extended neighborhood.

Given these specifications, consider (146). The tense characterizer PRS is an X3 Level prehead characterizer; therefore, all items within the first V3 above it are in its immediate neighborhood. This includes the anaphor [N3 e]. The phrase *this book* is in a V3 recursion above the immediate neighborhood; hence, it is in an extended neighborhood. Both *this book* and the [e] are phrases of the same type; accordingly, *this book* is the referent for [e] and the object of *burn* even though it precedes the subject.

While the definitions and conditions presented in this section have been simplified for expository purposes, they nonetheless satisfy all the major difficulties that have been presented in previous sections. There are, quite naturally, some more difficult examples to be considered, but the essential direction of the solution presented here is correct and extends, with some elaboration, to other very complicated examples. We will consider some of those in Chapter Five, when we relate syntax to human cognitive abilities.

The crucial result of our investigation is that it is possible to formalize even complex relationships in terms of linear and hierarchical structure. We have succeeded in reducing all phrases to variations on one frame (123). Furthermore, we have provided formal, explicit definitions of relations like SUBJECT, OBJECT, REFERENCE, and so on. We have done this without transformational rules. In short, our entire solution is based on the concept *phrase* that is rooted in human cognitive capacity.
EXERCISES FOR CHAPTER THREE

1. Draw TG diagrams for the DEEP STRUCTURE of the following sentences:

   a. The book may be in the library.
   b. John will not read those magazines.
   c. Mary will send a letter to the company.
   d. John reads those magazines.
   e. The roses border the fence.
   f. The accident occurred at the corner.
   g. The plant fell out the window.
   h. The boy could take the garbage out.
   i. The boy could take out the garbage.
   j. The book was not in the library.

2. Collapse each of the following sets of rules into one rule using formal abbreviatory devices (parentheses and curly brackets):

   a. The symbol QNT = QUANTIFIER (more, all, half, etc.)

      \[
      \begin{align*}
      \text{NP} & \xi \text{ DET} + \text{N} \\
      \text{NP} & \xi \text{ QNT} + \text{DET} + \text{N} \\
      \text{NP} & \xi \text{ QNT} + \text{N} \\
      \text{NP} & \xi \text{ N}
      \end{align*}
      \]

   b. The symbol AP = ADJECTIVE PHRASE

      \[
      \begin{align*}
      \text{VP} & \xi \text{ V} \\
      \text{VP} & \xi \text{ V} + \text{PP} \\
      \text{VP} & \xi \text{ V} + \text{AP} \\
      \text{VP} & \xi \text{ V} + \text{NP}
      \end{align*}
      \]

3. As we have noted in the text, the PS–Rules given in (35) are incomplete. They will have to be revised to accommodate each new structure we consider. Such revisions must be justified by argument, and the details of proposals must be carefully worked out. Which of the following sentences can be generated by (35)? Which cannot and, therefore, will require that (35) be revised? What sort of revisions are necessary?

   a. The gardener should water those shrubs with a fine spray.
   b. The nearsighted soprano fell into the orchestra pit.
   c. They will probably read the assignment reluctantly.
   d. A new cook from India prepared all the meals.
   e. John thinks Bill will come.
4. All of the following sentences have the same basic phrase structure, that is, they contain the same basic units. Keep this in mind as you provide TG diagrams for them.

a. The soprano sang the aria with skill.
b. The young soprano from a small town in the south of France sang the aria with skill.
c. The soprano sang the aria from the third act of an opera by Verdi with skill.
d. The soprano sang the aria with the skill of a seasoned veteran.
e. The young soprano from a small town in the south of France sang the aria from the third act of an opera by Verdi with the skill of a seasoned veteran.

5. Structurally ambiguous sentences must be given a different diagram for each structural ambiguity. For example, the sentence *Bill may slip on the boots* has the following two diagrams in TG format:

a. For the meaning *on the boots, Bill may slip:*

```
S  
|   
|NP     AUX
  |     VP
   |   V
    |  PP
     |P
      |DET
       NP
        N
         boots
```

b. For the meaning *Bill may slip the boots on:*

```
S  
|   
|NP     AUX
  |     VP
   |   V
    |  PP
     |P
      |DET
       NP
        N
         boots
```

Provide disambiguating diagrams for each of the following ambiguous sentences:
a. The thief hit the lady with the hat.
b. The repair man will look up the street.
c. John left the house messy.
d. The prisoner of war spoke foolishly.

6. What problems, if any, do the following ambiguous sentences pose for the TG model of grammar?

a. They hired Spanish teachers.
b. They are all finished.
c. They do so love a good meal.
d. We made them idols.
e. They made idols.

7. Draw RG diagrams for the following sentences:

a. The book may be in the library.
b. John will not read those magazines.
c. Mary will send a letter to the company.
d. John reads those magazines.
e. The roses border the fence.
f. The accident occurred at the corner.
g. The plant fell out the window.
h. The boy could take the garbage out.
i. The boy could take out the garbage.
j. The book was not in the library.

8. Draw diagrams for the following sentences in RG framework. What are the advantages of the X–Bar notation?

a. The gardener should water those shrubs with a fine spray.
b. The nearsighted soprano fell into the orchestra pit.
c. They will probably read the assignment reluctantly.
d. A new cook from India prepared all the meals.
e. John thinks Bill will come.

9. Draw diagrams for each of the meanings of the following sentences in the RG framework. Does the X–Bar notation allow you to reach a higher level of descriptive adequacy?

a. The thief hit the lady with the hat.
b. John left the house messy.
c. The repair man will look up the street.
d. The prisoner of war spoke foolishly.
e. They hired Spanish teachers.
f. They made idols.

10. Show that the following sentences must be assigned different structural descriptions no matter which theory of grammar is adopted.

a. (1) The boys made good cooks.
(2) The boys made good cakes.

Do the same with the following pair:

b. (1) The cars passed in the tunnel.
(2) The boys passed in the tests.
APPENDIX A: ANSWERS TO EXERCISES

1. Draw TG diagrams for the following sentences:

   a. The book may be in the library.

      S
     /   \
    NP   AUX
   /     /  \  \
DET  N   MOD  TNS  V
  the  book  may  PRS  be
     \             \         \       \         \    PP
       \             \         \       \    in NP
         \             \         \    DET
          \             \         N  NP
           \             \     the library

   b. John will not read those magazines.

      S
     /   \
    NP   AUX
   /     /  \  \ 
 N  MOD  TNS  NEG  V  NP
John  will  FUT  not  read  DET
       \       \     those  N
        \       \   NP
         \       \ magazines

   c. Mary will send a letter to the company.

      S
     /   \
    NP   AUX
   /     /  \  \ 
 N  MOD  TNS  FUT  V  NP
 Mary  will  FUT  send  DET
       \       \     a  N
        \       \   letter
         \       \ to  PP
          \       \    p NP
           \       \  to NP
            \       \  the
             \       \ company
d. John reads those magazines.

```
S
  NP  AUX  VP
    N    TNS  V
   John  PRS  read
           NP
            DET  N
               those  magazines
```

e. The roses border the fence.

```
S
  NP  AUX  VP
    DET  N  TNS  V
     the  roses  PRS  border
            NP
               DET  N
                  the  fence
```

f. The accident occurred at the corner.

```
S
  NP  AUX  VP  PP
    DET  N  TNS  V  P
     the  accident  PST  occur  at
             NP
                DET  N
                   the  corner
```

g. The plant fell out the window.

```
S
  NP  AUX  VP  PP
    DET  N  TNS  V  P
     the  plant  PST  fall  out
             NP
                DET  N
                   the  window
```
h. The boy could take the garbage out.

I. The boy could take out the garbage.

j. The book was not in the library.

2. Collapse each of the following sets of rules into one rule using formal abbreviatory devices (parentheses and curly brackets):

a. NP \( \xi \) \( \{ \text{QNT} \} + \{ \text{DET} \} + \{ \text{N} \} \)

b. VP \( \xi \) \( \{ \text{V} \} + \{ \text{PP, AP, NP} \} \)
3.  

a. (35) can generate the structure for *The gardener should water those shrubs with a fine spray:*

```
S
  NP
    det the gardener
  AUX shall
  VP
    V water
    NP
      det those shrubs
    PP with a fine spray
```

b. (35) cannot generate the structure for *The nearsighted soprano fell into the orchestra pit.* The phrase *orchestra pit* is a compound noun made up of two nouns (*orchestra* and *pit*). The rule (35d) for rewriting NP does not allow an NP to contain two nouns. Note that *orchestra* is a noun, not an adjective: it can be made plural (*orchestras*) and it cannot be made comparative (*more orchestra*).

c. (35) cannot generate the structure for *They will probably read the assignment reluctantly.* (35) contains no rule for adverbs. *Probably* is a sentence adverb (a constituent of S), so (35a) must be revised to allow an adverb. *Reluctantly* is a manner adverb (a constituent of VP), so (35b) must also be revised to allow an adverb.

d. (35) cannot generate the structure for *A new cook from India prepared all the meals.* *All* is a quantifier, and (35d) does not allow for the generation of a quantifier in an NP. The top line of (35d) would have to be revised as follows:

```
(QNT) + (DET) + (ADJ) + N + (PP)
```

e. (35) can generate the structure for *John thinks Bill will come.*
4. All of the following sentences have the same basic phrase structure, that is, they contain the same basic units. Keep this in mind as you provide TG diagrams for them.

a. The soprano sang the aria with skill.

```
S
   ^
  /\
NP  AUX
   / \
  DET N
   |   sing
  |   / NP
   |  |   PP
the soprano the aria with skill
```

b. The young soprano from a small town in the south of France sang the aria with skill.

c. The soprano sang the aria from the third act of an opera by Verdi with skill.

d. The soprano sang the aria with the skill of a seasoned veteran.

e. The young soprano from a small town in the south of France sang the aria from the third act of an opera by Verdi with the skill of a seasoned veteran.
5. Provide disambiguating diagrams for each of the following ambiguous sentences:

a. The thief hit the lady with the hat.

(1) = It was with the hat that the thief hit the lady.

```
S
  NP
    DET the
    N thief
  AUX
    TNS hit
  VP
    NP
      DET the
      N lady
    PP
      P with
      NP
        DET the
        N hat
```

(2) = It was the lady with the hat that the thief hit.

```
S
  NP
    DET the
    N thief
  AUX
    TNS hit
  VP
    NP
      DET the
      N lady
    PP
      P with
      NP
        DET the
        N hat
```

b. The (repair) man will look up the street.

Note: Repair man cannot be generated by the rules in (35); it is a compound noun like orchestra pit in exercise (3b) above. Still, the sentence remains ambiguous without the word repair in it.

(1) = It is up the street that the man will look.

```
S
  NP
    DET the
    N man
  AUX
    MOD will
  VP
    TNS look
    PP
      P up
      NP
        DET the
        N street
```
(2) = The man will look the street up.

\[ S \rightarrow NP \rightarrow AUX \rightarrow VP \rightarrow PP \rightarrow NP \]

\[ DET \rightarrow N \rightarrow MOD \rightarrow TNS \rightarrow V \rightarrow PP \rightarrow DET \rightarrow N \]

(1) = The house was messy when Ron left it.

\[ S \rightarrow NP \rightarrow AUX \rightarrow VP \rightarrow ADJ \]

\[ DET \rightarrow N \rightarrow DET \rightarrow N \]

(2) = Ron was messy when he left the house.

\[ S \rightarrow NP \rightarrow AUX \rightarrow VP \rightarrow ADJ \]

\[ DET \rightarrow N \rightarrow DET \rightarrow N \]

Note: While this diagram would appear to be satisfactory to account for the meaning in which *messy* modifies *Ron*, it will prove to be descriptively inadequate when other sentences are considered. For example, we know that a manner adverb like *reluctantly* must be part of the VP (see exercise (5d) below and the explanation for (3c) above). There are sentences like *Ron left the house messy reluctantly*, which are still ambiguous as to whether it is Ron or the house that was left messy. Thus, the above diagram is descriptively inadequate: since *reluctantly* must part of the VP in both readings of the sentence *Ron left the house messy reluctantly* (it is a manner adverb in both readings), then *messy* cannot be outside of the VP as in the above diagram. The standard theory fails in this case.
d. The prisoner of war spoke foolishly.

(1) = The manner in which the prisoner of war spoke was foolish.

(2) = It was foolish of the prisoner of war to speak. (foolishly is a sentence adverb)

6. What problems, if any, do the following ambiguous sentences pose for TG?

Within the TG framework, there is no way to disambiguate any of the following sentences, that is, PS-Rules, like those in (35), cannot handle the subtle distinctions made.

a. They hired Spanish teachers means either They hired teachers who are Spanish or They hired teachers of Spanish. Notice that we have They hired Spanish Spanish teachers.

b. They are all finished means either All of them are finished or They are completely finished. Notice that we have They are all all finished.

c. In They do so love a good meal, so emphasizes do as in They do too love a good meal or it emphasizes love as in He really loves a good meal.

d. We made them idols means We made them into idols (like We elected them officers) or We made idols for them (like We bought them presents).

e. They made idols means either They became idols or They created idols. The verb make, therefore, can be used either as a transitive verb (one that takes a direct object) or as a copulative verb (one that has a complement which refers back to the subject).

7. Draw RG diagrams for the following sentences:
a. The book may be in the library. (*be* is a copulative verb; note the V2)

b. John will not read those magazines. (*read* is a transitive verb; note the V1)

c. Mary will send a letter to the company. (*send* is a transitive verb; note the V1)
d. John reads those magazines. (*read* is a transitive verb; note the V1)

![Diagram for d.]

e. The roses border the fence. (*border* is a transitive verb; note the V1)

![Diagram for e.]

f. The accident occurred at the corner. (*occur* is an intransitive verb; note the V2)

![Diagram for f.]

g. The plant fell out the window. (*fall* is an intransitive verb; note the V2)

![Diagram for g.]
h. The boy could take the garbage out. (*take* is a transitive verb; note the V1)

![Sentence diagram]

i. The boy could take out the garbage. (*take* is a transitive verb; note the V1)

![Sentence diagram]

j. The book was not in the library. (*be* is a copulative verb; note the V2)

![Sentence diagram]
8. Draw diagrams for the following sentences in RG framework. What are the advantages of the X–Bar notation?

a. The gardener should water those shrubs with a fine spray.

b. The nearsighted soprano fell into the orchestra pit.
c. They will probably read the assignment reluctantly.

d. A new cook from India prepared all the meals.

e. John thinks Bill will come.
9. a. The thief hit the lady with the hat.

(1) = It was with the hat that the thief hit the lady.

(2) = It was the lady with the hat that the thief hit.
b. Ron left the house messy.

(1) = The house was messy when he left it.

(2) = Ron was messy when he left the house.
c. The repair man will look up the street.

(1) = The repair man will look the street up.

(2) = It is up the street that the repair man will look.
d. The prisoner of war spoke foolishly.

(1) = It was foolish of the prisoner of war to speak.

(2) = The way the prisoner of war spoke was foolish.
e. They hired Spanish teachers.

(1) = teachers who were Spanish

(2) = teachers of Spanish

f. They made idols

(1) = They became idols.

(2) = They built idols.

10. a. The following data indicate that *The boys made good cooks* and *The boys made good cakes* must have different structural descriptions:

   (1) a. *The boy made good cooks.
       b. The boy made good cakes.

   (2) a. *Good cooks were made by the boy.
       b. Good cakes were made by the boy.

b. The following data indicate that *The cars passed in the tunnel* and *The boys passed in the tests* must have different structural descriptions:

   (1) a. *The cars passed the tunnel in.
       b. The boys passed the tests in.

   (2) a. It was in the tunnel that the cars passed.
       b. *It was in the tests that the boys passed.
APPENDIX B: LATIN SYNTAX

Latin verbs must agree with their subjects in number:

1. a. Agricola lupam necat. The farmer kills the wolf.
   b. Agricola lupas necat. The farmer kills the wolves.

2. a. Agricolae lupam necant. The farmers kill the wolf.
   b. Agricolae lupas necant. The farmers kill the wolves.

Agreement patterns between subjects and verbs:

3. a. Singular: Subject–a–Ø verb–a–t
   regin–a–Ø voc–a–t
   b. Plural: Subject–a–e verb–a–nt
   regin–a–e voc–a–nt

4. a. *Agricola lupas necant.
   b. *Agrocilae lupam necat.

Latin adjectives and numerals must agree with the nouns they modify in both number and case:

5. a. Laeta agricola malas lupas duas necat.
   ‘The happy farmer kills the two bad wolves.’
   b. Amicae feminae duae aegras aegricolas duas curant.
   ‘The two friendly women take care of the two sick farmers.’

Phrase Structure Rules for Latin:

6. a. S ξ NP + VP
   b. VP ξ NP + V
   c. NP ξ ADJ₀ + N + (NUM)
Rules for Case Marking and Rules for Agreement:

8. NP dominated by S is subject; all elements of that NP are in the nominative case (–Ø if singular, –e if plural).

9. NP dominated by VP is object; all elements of that NP are in the accusative case (–m if singular, –s if plural).

10. If the subject is singular, verb ends in –t; if the subject is plural, verb ends in –nt.

After these rules apply to the above tree, the grammar generates the sentence *Aminae feminae duae aegras agricolas duas curant*.

Vocabulary:

11. Nouns (quoted in the nominative singular feminine form):

<table>
<thead>
<tr>
<th>Noun</th>
</tr>
</thead>
<tbody>
<tr>
<td>lupa ‘wolf’</td>
</tr>
<tr>
<td>luna ‘moon’</td>
</tr>
<tr>
<td>regina ‘queen’</td>
</tr>
<tr>
<td>agricola ‘farmer’</td>
</tr>
<tr>
<td>stella ‘star’</td>
</tr>
<tr>
<td>casa ‘cottage’</td>
</tr>
<tr>
<td>fabula ‘story’</td>
</tr>
<tr>
<td>domina ‘mistress’</td>
</tr>
</tbody>
</table>

12. Adjectives (quoted in the nominative singular feminine form):

<table>
<thead>
<tr>
<th>Adjective</th>
</tr>
</thead>
<tbody>
<tr>
<td>mala ‘bad’</td>
</tr>
<tr>
<td>pulchra ‘pretty’</td>
</tr>
<tr>
<td>multa ‘many’</td>
</tr>
<tr>
<td>clara ‘famous’</td>
</tr>
<tr>
<td>bona ‘good’</td>
</tr>
<tr>
<td>amica ‘friendly’</td>
</tr>
<tr>
<td>inimica ‘unfriendly’</td>
</tr>
<tr>
<td>laeta ‘happy’</td>
</tr>
</tbody>
</table>

13. Verbs (quoted in the infinitive form):

<table>
<thead>
<tr>
<th>Verb</th>
</tr>
</thead>
<tbody>
<tr>
<td>liberare ‘free’</td>
</tr>
<tr>
<td>vocare ‘call’</td>
</tr>
<tr>
<td>laudare ‘praise’</td>
</tr>
<tr>
<td>aedificare ‘build’</td>
</tr>
<tr>
<td>necare ‘kill’</td>
</tr>
<tr>
<td>curare ‘care for’</td>
</tr>
<tr>
<td>adorare ‘worship’</td>
</tr>
<tr>
<td>superare ‘conquer’</td>
</tr>
</tbody>
</table>

14. Others:

<table>
<thead>
<tr>
<th>Word</th>
</tr>
</thead>
<tbody>
<tr>
<td>non ‘not’</td>
</tr>
<tr>
<td>et ‘and’</td>
</tr>
</tbody>
</table>
APPENDIX C: SUMMARY OF TREE STRUCTURES

1. Traditional grammar (confuses functional and structural categories):

   ![Traditional grammar diagram]

2. Structural grammar and TG (not enough internal levels for phrases):

   ![Structural grammar diagram]

3. X–bar grammar and RG:

   ![X–bar grammar diagram]

4. Sentence with a transitive verb (*John studies Latin*):

   ![Sentence with a transitive verb diagram]
5. Noun phrase structure (John’s study of Latin...):

```
<table>
<thead>
<tr>
<th></th>
<th>C3</th>
<th>N3</th>
</tr>
</thead>
<tbody>
<tr>
<td>N0</td>
<td></td>
<td>N0</td>
</tr>
<tr>
<td>SUBJECT</td>
<td></td>
<td>of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OBJEKT</td>
</tr>
</tbody>
</table>
```

6. Noun phrase structure (all the/Ø study of Latin...):

```
<table>
<thead>
<tr>
<th></th>
<th>C3</th>
<th>N3</th>
</tr>
</thead>
<tbody>
<tr>
<td>N0</td>
<td></td>
<td>N0</td>
</tr>
<tr>
<td>QUANTIFIER</td>
<td></td>
<td>of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OBJEKT</td>
</tr>
</tbody>
</table>
```

```
<table>
<thead>
<tr>
<th></th>
<th>C3</th>
<th>N3</th>
</tr>
</thead>
<tbody>
<tr>
<td>N0</td>
<td></td>
<td>N0</td>
</tr>
<tr>
<td>all</td>
<td></td>
<td>of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Latin</td>
</tr>
</tbody>
</table>
```
7. Sentence with an intransitive (*John died happy/happily*) or copulative verb (*John was happy*):

```
N3  
|   C3  
|     V3  
|       |   |   
|       N0  C0  
|       SUBJECT TENSE HEAD COMPLEMENT
```

```
N3  
|   C3  
|     V3  
|       |   |   
|       N0  C0  
|       John PST die C3  
|       happy happily
```

```
N3  
|   C3  
|     V3  
|       |   |   
|       N0  C0  
|       John PST be C3  
|       happy
```
4.1 PRELIMINARY REMARKS

Of all of the areas of grammar which linguists have studied, by far the most puzzling and problematic is semantics, the area which concerns the meanings of words and sentences. Despite the efforts of numerous linguists, philosophers, psychologists, and anthropologists, a number of very fundamental questions remain unanswered both in regard to the meaning of words and to the meaning of sentences. Consider, for example the question of what a particular word, say, table, means. It is clear that when native speakers of English use the word table, they are referring to a specific object and recognize in that object certain identifiable characteristics which make the use of table appropriate. Still, it is exceedingly difficult to determine what these identifiable characteristics are, considering all of the various types of objects which are called a table. Even words such as dog and cat present problems. Although a biologist could give a highly specific definition of both of these animals by referring to particular anatomical and physiological features, it is obvious that the average speaker does not distinguish a dog from a cat by referring to such features, e.g., that a dog has two upper molar teeth while a cat has only one. When words such as beauty, love, and joy are brought into the picture, the problem of providing definitions reaches nearly unmanageable proportions, for words such as these, in addition to referring to intangible objects, also vary considerably in meaning from speaker to speaker.

In translating from one language to another, these problems are compounded because the sphere of objects named by a particular word is rarely the same from language to language. For example, the English word uncle can refer either to one’s mother’s brother or one’s father’s brother (among others). In Latin, these two relatives are distinguished by separate words: avunculus is one’s maternal uncle, and patruus is one’s paternal uncle. This distinction was important in ancient Rome to designate who a minor’s guardian would be upon the death of parents. In general, kinship terms vary greatly from language to language, reflecting social custom and law. The same can be said about words to designate color, shape, time, place, and many other categories. One successful approach to describing such cultural differences has been to break the categories down to features and describe the different classes as different arrangements of features. We will take this approach in analyzing English prepositions. The important point to keep in mind now is that any child can learn any of these systems as part of his native language. Such cultural differences, therefore, must reflect innate abilities of human perception and categorization.

4.2 DENOTATION AND CONNOTATION

In an effort to cope with the problem of definition, semanticists have recognized a number of useful distinctions in the meaning of a word. One of these is the distinction between DENOTATION and CONNOTATION. The denotative meaning of a word is its specific, exact meaning, excluding all of its extended uses and emotional colorations. On the other hand, a connotative meaning is any meaning which carries some special implication or association. Thus, in (1) the word fox is used
in its denotative meaning to refer to a specific animal, while in (2) it is used in a connotative meaning to imply a crafty person.

(1) A hungry *fox* was seen prowling around the chicken coop.

(2) Mary doesn’t trust John, because he’s such a *fox*.

### 4.3 SYNONYM, HOMONYMY, AND ANTONYMY

Other terms often used by semanticists in defining words and indicating relationships among them include SYNONYM, HOMONYM, and ANTONYM. Two words are synonyms if they are pronounced differently, but mean the same thing, e.g., *huge* and *enormous* (adjectives), *oculist* and *eye doctor* (nouns), *imprison* and *incarcerate* (verbs); they are homonyms if they are pronounced the same, but have different meanings, e.g., *bank* (river’s edge) and *bank* (financial institution); they are antonyms if they mean opposite things, e.g., *hot* and *cold* (adjectives), *love* and *hate* (nouns or verbs).

Antonyms fall into two groups: complementary and gradable. Complementary anonyms are absolute opposites like *male* and *female*, *dead* and *alive*, *present* and *absent*, etc., in which the negative of one is synonymous with the other. Thus, if one is not male, one is female; or, if one is not female, one is male. Gradable anonyms are not absolute opposites; the negative of one is not synonymous with the other, e.g., *fast* and *slow*, *big* and *little*, etc.

### 4.4 HYPONYMY/HYPERNYMY AND MERONYMY/HOLONYMY

Semanticists also make distinctions between HYPONYMY/HYPERNYMY which is the member/class distinction; for example, *robin* is a hyponym of *bird*, and *bird* is a hyponym of *animal*. Such relationships are TRANSITIVE, which means that the reverse relationship also holds: *animal* is a hypernym of *bird*, and *bird* is a hypernym of *robin*.

Closely related is the distinction between MERONYMY and HOLONYMY, that is, the part/whole relationship; for example, *ceiling* is a meronym or *room*, and *room* is a meronym of *house*. This distinction is also transitive: *house* is a holonym of *room*, and *room* is a holonym of *ceiling*.

### 4.5 IDIOMS

Semanticists also make a distinction between idiomatic and non–idiomatic meaning. An IDIOM is a highly specialized expression whose meaning typically cannot be deduced from the meaning of the words out of which it is composed. Expressions like *shoot the breeze*, *be up tight*, and *so long* are examples of idioms. In most instances, idioms are fixed in usage and cannot be expanded or modified. For example, one cannot say *We shot a southwesterly breeze yesterday.*
(3)  

a. We were shooting the breeze.
   1. *We were shooting a southwesterly breeze.
   2. We were cheerfully shooting the breeze.
   3. We shot the tigers./The tigers were shot by us.
   4. We shot the breeze./*The breeze was shot by us.

b. He was pulling your leg.

   1. Were you pulling my (her, John’s) leg?
   2. Were you pulling (*yanking, tugging) my leg (*arm, hair).
   3. Sue’s leg’s been pulled so many times that she doesn’t trust anyone anymore.

On the other hand, idioms must be assigned a syntactic structure because they are subject to rules. For example, consider the rule of Particle Movement (the movement of an intransitive preposition) as it applies in the following:

(4)  

Particle Movement.

a. The teacher handed out the assignment.
   The teacher handed the assignment out.

b. The teacher spoke about the assignment.
   *The teacher spoke the assignment about.

c. John gave away the show.
   John gave the show away.

d. John beats around the bush.
   *John beats the bush around.

e. Further examples: bark up the wrong tree, bring down the house, go off the deep end, jump down one’s throat, lay down the law, let down one’s hair, make up one’s mind, pay through the nose, sit on the fence

4.6 AMBIGUITY AND PARAPHRASE

In the study of meaning, linguists have also been concerned with AMBIGUITY and PARAPHRASE. There are a great many pairs of words, phrases or sentences in all languages which are ambiguous, that is, which are phonologically identical but semantically distinct; others are paraphrases, that is, phonologically distinct but semantically similar.

(5)  

AMBIGUITY (one sound, more than one meaning).
a. Lexical level, the level of the word.
   1. After making the right turn at the corner,...
   2. After making the left turn at the corner,...

b. Phrasal level.
   1. He looked over the fence.
   2. He looked under the fence.

c. Sentential level.
   1. Visiting relatives can be boring.
   2. The chickens are ready to eat.
   3. What worried John was being ignored by everybody.

(6) PARAPHRASE (one basic meaning, more then one sound).
   a. Lexical level.
      1. They murdered/killed the president.
      2. Mary picked up the pail/bucket.

   b. Phrasal level.
      1. John resembles Bill./John is similar to Bill.
      2. John is a father./John has children.

   c. Sentence level.
      1. The bees are swarming in the garden./The garden is swarming with bees.
      2. John is easy to please./It is easy to please John.

(7) Disambiguating sentences with paraphrase.
   a. Moving vehicles can be hazardous.
      1. Vehicles which are moving can be hazardous.
      2. It can be hazardous to move vehicles.
b. The baby is too young to stand up.

1. The baby is too young for someone to stand up.
2. The baby is too young to stand up by itself/himself/herself.

Most native speakers are unaware of ambiguity when it occurs because context favors one meaning over others. The task of the linguist is to ascertain what differences, if any, there are between each member of the ambiguous pair. Very often, the members can be shown to be syntactically distinct. For example, when sentence (7a) receives the first interpretation, the word vehicle is the subject of the word move, and when the sentence receives the second interpretation, vehicle is the object of move.

4.7 PRAGMATICS

Beyond these considerations, most of the problems in sentence meaning which linguists have been especially interested in concern either the relationship between semantics and the other components of grammar, particularly syntax and phonology, or the relationship between semantics and such extra–linguistic or PRAGMATIC facts as the beliefs and knowledge a person has about the world. The interaction of phonology and semantics is clearly illustrated in the following set of examples (upper–case type indicates heavy stress):

(8) a. After John complimented Mary, SHE complimented HIM.
b. *After John complimented Mary, she COMPLIMENTED him.
c. *After John complimented Mary, SHE insulted HIM.
d. After John complimented Mary, she INSULTED him.

Notice that the pronouns in the second half of these sentences receives stress only when the meaning of the verbs in both halves is identical. When the meaning of the verbs in both halves is not identical, then the verbs themselves receive the heavy stress. This is an example of how the phonological rules of a language can depend on semantic structure.

Lastly, notice that the interpretation of the following sentences depends on specific beliefs that people have.

(9) a. After John called Mary a republican, SHE complimented HIM.
b. After John called Mary a republican, she COMPLIMENTED him.
c. After John called Mary a republican, SHE insulted HIM.
d. After John called Mary a republican, she INSULTED him.

(10) a. Both of John’s parents are schizophrenics, and it looks as though John is crazy too.
b. Both of John’s parents are skydivers, and it looks as though John is crazy too.
c. Both of John’s parents are engineers, and it looks as though John is crazy too.
For most speakers of English, the sentiment expressed in (10a) would be considered reasonable, since they know that schizophrenia is a form of mental illness, and the one in (10c) would be considered unreasonable, since most people do not equate engineering with insanity. The status of (10b), on the other hand, would probably vary. If people are skydivers, they are likely to find it unreasonable; however, other people, who believe that anyone willing to jump out of a plane without immediately opening a parachute is insane, would find (10b) reasonable.

4.8 THEMATIC RELATIONS: CASE GRAMMAR

One of the best understood areas of semantics concerns the roles that various noun phrases fulfill in a sentence, roles such as AGENT and INSTRUMENT. The research was originally carried out by Charles Fillmore in the 1960s and became known as CASE GRAMMAR because of its similarity with the study of grammatical case in traditional grammar. Over the past thirty years, case relations have been investigated by many other linguists in a variety of theoretical frameworks. Many scholars have pointed out that the SEMANTIC FUNCTION (AGENT or INSTRUMENT) that a noun phrase has in a sentence often appears to be of greater significance than its SYNTACTIC FUNCTION (SUBJECT or OBJECT). For example, although the syntactic function of the noun phrase the door in (11) changes, its semantic function does not.

(11)  
  a. The door will open.  \hspace{1cm} door is subject  
  b. The janitor will open the door.  \hspace{1cm} door is object  
  c. The door will open with this key.  \hspace{1cm} door is subject  
  d. This key will open the door.  \hspace{1cm} door is object

There are many similar cases in English and other languages such as those in (12).

(12)  
  a. John broke the dish.  \hspace{1cm} dish is object  
  b. The dish broke.  \hspace{1cm} dish is subject  
  c. John started the car.  \hspace{1cm} car is object  
  d. The car started.  \hspace{1cm} car is subject  
  e. John woke up the baby.  \hspace{1cm} baby is object  
  f. The baby woke up.  \hspace{1cm} baby is subject

Consider also the various roles that the subject children plays in the following:

(13)  
  a. Children walk easily.  
  b. Children fall easily.  
  c. Children frighten easily.  
  d. Children cry easily.
The role of a noun phrase in relation to a particular verb determines not only how it will be understood in a sentence, but also how it will behave. For example, in (14) Mary can be understood as either an ACCOMPANIER or as an INSTRUMENT.

(14) John broke the window with Mary.

As (15) shows, different roles cannot usually be combined.

(15) a. John broke the window. (John is agent)
    b. A hammer broke the window. (hammer is instrument)
    c. *John and a hammer broke the window.

Relations like AGENT, ACCOMPANIER and INSTRUMENT, which specify the role that a noun phrase plays in a sentence, are called CASE RELATIONS or THEMATIC RELATIONS. In his earliest formulations, Fillmore proposed the following case relations:

(16) AGENTIVE: the case of the typically animate perceived instigator of the action identified in the verb (often simply called AGENT).

    a. JOHN opened the door.
    b. The door was opened BY JOHN.

(17) INSTRUMENTAL: the case of the inanimate force or object causally involved in the action or state identified in the verb.

    a. THE HAMMER broke the window.
    b. The window was broken WITH THE HAMMER.
    c. THE HURRICANE destroyed the village.

(18) OBJECTIVE: the semantically most neutral case; typically the case of the thing directly affected by the action or state identified in the verb. (Not to be confused with the notion direct object; often called PATIENT or THEME)

    a. Someone opened THE DOOR. (door is both direct object and objective case.)
    b. THE DOOR opened. (door is subject, but still objective case.)

(19) DATIVE: the case of the usually animate entity affected by the state or action identified in the verb (often called EXPERIENCER or RECIPIENT).

    a. John gave the book TO BILL.
    b. BILL received the book.
    c. The movie appeals to HIM.
    d. THE SNOW melted.
(20) **POSSESSIVE**: the case of the possessor.

a. JOHN’S book is on the table.
b. JOHN owns that book.

(21) **LOCATIVE**: the case which identifies the location or spatial orientation of the state or action identified in the verb.

a. It happened IN ITALY.
b. The book is ON THE TABLE.

(22) **GOAL**: the case which identifies the direction of the state or action identified in the verb.

a. John flew TO ITALY.
b. John ran INTO THE HOUSE.

(23) **SOURCE**: the case which identifies the origin of the state or action identified in the verb.

a. John flew FROM ITALY.
b. John ran OUT OF THE HOUSE.

Given an inventory of thematic relations like the above, a linguist can specify the roles that noun phrases play with particular verbs. For example, we can characterize the verb open as follows:

(24) a. It requires an OBJECTIVE and tolerates an INSTRUMENTAL and/or AGENTIVE.

b. If only the OBJECTIVE NP occurs, it must be the subject:
   [1] The door can open. ACTIVE
   [2] The door will be opened. PASSIVE

c. If the INSTRUMENTAL also occurs, either the OBJECTIVE or the INSTRUMENTAL can be subject.
   [1] The door can open with a key. ACTIVE
   [2] The door can be opened with a key. PASSIVE
   [3] A key can open the door. ACTIVE

d. If the OBJECTIVE and the AGENTIVE occur, either can be subject.
   [1] A janitor can open the door. ACTIVE
   [2] The door can be opened by a janitor. PASSIVE

e. If all three cases occur, either the AGENTIVE or the OBJECTIVE can be subject, but the INSTRUMENTAL cannot.
   [1] A janitor can open the door with a key. ACTIVE
   [2] The door can be opened with a key. PASSIVE
As these examples indicate, the thematic relation of an NP in English is signaled overtly by a preposition unless that NP is a subject or object. For example, the instrumental relation is signaled by the preposition *with* except when the instrument is in subject position (cf. (24c3)). Fillmore argued that this indicates that the case relations should be directly represented in DEEP STRUCTURE, and that subject and object should be derived from full prepositional phrases in English. For example, he proposed that the deep structure of (25a) would be something like (25b).

(25) a. The janitor will open the door with the key.

b. \[ S [AUX will] [VP [V open] [PP of the door] [PP by the janitor] [PP with the key] ] \]

Rules of **SUBJECT FORMATION** and **OBJECT FORMATION** then turn these structures into structures of the more familiar type like (26).

(26) \[ S [NP the janitor] [AUX will] [VP [V open] [NP the door] [PP with the key] ] \]

### 4.9 THE MEANING AND USE OF THE WORD CASE

In a description such as the above, an important distinction must be made between THEMATIC or CASE RELATIONS and the traditional use of case as a label for a particular morphological category. For example, in Latin, we find inflectional endings like the following:

(27) a. Nominative (–s suffix): the case of the subject.

b. Accusative (–m suffix): the case of the direct object.


A term like subject or direct object is a label for a SYNTACTIC RELATION (SYNTACTIC FUNCTION); these indicate specific positions that a noun phrase occupies in a SYNTACTIC HIERARCHY like (26). Notice that the subject is the NP immediately dominated by the S node, and the object is the NP immediately dominated by the VP node. A term like agent or agentive is a label for a THEMATIC RELATION (SEMANTIC FUNCTION); these specify the various roles that a noun phrase can play in a sentence. In English, these are usually indicated by prepositions; in languages like Japanese, they are indicated by postpositions; and in languages like Latin, they are frequently indicated by inflectional endings called case endings.

Quite frequently in languages, these functions overlap, so there is some terminological confusion. Thus, the word case is used for both a morphological category (a case or inflectional ending) or a semantic category (a case or thematic relation). Compare the following examples.
As (28c) shows, a term like nominative or accusative is a label for a GRAMMATICAL or MORPHOLOGICAL FORM. But these terms are also used for both syntactic and semantic functions. For example, in (28c), Marcus carries the morphological marker for the nominative case indicating the subject, a syntactic function. But, at another level of analysis, Marcus (still marked nominative) is also Fillmore’s agentive case, which is a semantic function. Consider the following example from English:

(29) I saw him.

a. *him* is direct object:
   SYNTACTIC RELATION or SYNTACTIC FUNCTION.
b. *him* is accusative case:
   GRAMMATICAL or MORPHOLOGICAL FORM.
c. *him* is objective case:
   THEMATIC RELATION or SEMANTIC FUNCTION.
Unfortunately, there is even further terminological confusion. Some grammarians use the term *objective case* to refer to the grammatical form of the direct object. The term *possessive* has been used for all three of the above.

### 4.10 PROBLEMS WITH CASE GRAMMAR

Regardless of terminology, CASE GRAMMAR has much to recommend it, though it does leave some facts unaccounted for. For example, this approach leaves unexplained the fact that languages use the same prepositions (grammatical case/postpositions) to express apparently different thematic relations.

(30)  

a. *to* as Fillmore’s Dative and Goal:

[1] The movie appeals to him. (Dative)
[2] John flew to Italy. (Goal)

b. *of* as Fillmore’s Agentive, Objective and Possessive:

[1] the crying of babies
[2] the taking of pictures
[3] the shooting of hunters
[4] the pictures of those painters

[a] the pictures painted by those painters
[b] the pictures with those painters in them
[c] the pictures those painters own

Furthermore, CASE GRAMMAR cannot explain why languages use the same markers (prepositions, postpositions, inflectional endings) for both positional and nonpositional thematic relations as in (31).

(31)  

[+POSITIONAL]  
He put it into the vase.  
He took it out of a vase.  
He headed for freedom.  
He withdrew from the heat.

[–POSITIONAL]  
He turned it into a vase.  
He made it out of a vase.  
He died for freedom.  
He died from the heat.

Although the same marker is used, there is a clear difference between the phrases contrasted in (31). For example, only a [+POSITIONAL] phrase can be substituted with *here, there, where, etc.*:
4.11 RG SEMANTICS

The central hypothesis articulated in the preceding chapters is that the categories of language are natural classes of features reflective of the nature of the human language apparatus. Further, we have postulated that languages differ because they select and organize these universal and biologically determined features differently. If semantic analysis is to parallel the analysis of syntax and phonology, which one would expect, then one should look first at the categories linguists have postulated to account for meaning. The largest group of such categories comprises case or thematic relations.

Over the past twenty–five years, a number of linguists have attempted to incorporate the case relationships of traditional grammar into formal grammatical theory. All of these efforts have one thing in common: they attempt to explicate the nature, distribution, and manifestation of thematic relations like AGENT, INSTRUMENT, SOURCE, GOAL, etc.

Within the entire group of thematic relations that have been proposed in the literature, a basic division occurs between positional [+PST] and nonpositional [–PST] relations. In the former group, we have such relations as PLACE and DIRECTION; in the latter, AGENT and PATIENT. For some reason that is not clear, the former group has been given short shrift by modern theorists, and most of the attention has been focused on the nonpositional relations. This is a fundamental error, because the positional relations are more concrete and, therefore, undeniably easier to specify, and because the nonpositional relations are clearly related to and derived from the positional relations. Languages, in general, do not have two separate sets of thematic markers (prepositions, postpositions, grammatical cases, etc.), one for relations that are [+PST], and another for those that are [–PST]. Thus, for example, in the ancient Indo–European languages, all separative relations are expressed by the ablative case, if there is one. This includes actual perceived movements in the direction away, e.g., SOURCE, as well as expressions of freedom, deprivation, abandonment, etc. We have such examples as the following in Latin (29) and Sanskrit (30):

(29) a. Eius milites ab opere (ABLATIVE) vacabant.
   ‘His soldiers are free from work.’
   (Caesar, De Bello Civili, 3, 21)

   b. Oculis (ABLATIVE) se privavit.
   ‘He deprived himself of his eyes.’
   (Cicero, De Finibus Bonorum et Malorum, v. 42)

(30) a. n~sm~d gan~c (ABLATIVE) chidyate.
   ‘The people are not cut off from him.’
   (Catapatha–Brahmana, 14, 5, 1, 10)
b. sa evainam varunap-∔-∔ (ABLATIVE) muñcati.
   ‘He releases him from Varuna’s snare.’
   (*Taittiriya–Samhita*, 2, 1, 2, 2)

In ancient Greek, which has no ablative case, the separative functions of the ablative are expressed by the genitive:

(31) a. aposterei me tÇn chr̲mâtÇn (GENITIVE).
   ‘He deprives me of my property.’
   (Isocrates, 12, 35)

   b. tÇn epitÈheiÇn (GENITIVE) ouk aporÈsomen.
   ‘We shall not be without provisions.’
   (Xenophon, *Anabasis*, 2, 2, 11)

Whatever the defects of traditional terminology, in the Indo–European languages which have an ablative, it remains that the ablative is the "from–case"; therefore, all governors (verbs, adjectives, etc.) having to do with separative notions are construed with the ablative, independent of their (syntactic) categorial membership. When the ablative is lost as a morphologically distinct case as in Greek, there is order in the way the functions of the ablative are distributed among the remaining cases. That order is specified by semantic classes like separative notions. The same situation obtains in other languages with grammatical case, including those as diverse as Inuit and Finnish: semantic relationships are grouped into classes, and these classes are realized by the same grammatical case.

When languages do not have elaborate case systems, but express thematic relations with prepositions (English) or postpositions (Japanese), we find the same basic criterion of semantic commonality underlying the use of these particles. Therefore, it is not an accident, for example, that from occurs in separative phrases like the following, whether or not real movement occurs:

(32) a. He ran from his office (his father, is responsibilities, etc.)
   b. He is back from Europe (the market, unconsciousness, etc.).
   c. Keep this away from the children.
   d. She can’t tell puce from fuchsia.
   e. He can’t find any relief from pain.
   f. They’ll be here an hour from now.
   g. We got a note from the dean.
   h. He died from overexposure.
   i. We made it from these instructions.
   j. We made it from the materials we had.

In examples like the above, there is a direct connection between positional phrases (from his office) and nonpositional phrases (from fuchsia), however one wishes to term this connection (denotative
connotative; literal) figurative; literal) metaphorical; central) extended; etc.). Furthermore, these examples are typical: as we will see, similar sets exists for the other prepositions in English (to, in, out, over, etc.); and, one can easily construct other sets for non–Indo–European languages, e.g., the postpositions ni, e, kara, de, etc. in Japanese.

Theories of case grammar cannot account for data such as those in (32) in a way that relates the positional and nonpositional uses of prepositions. In Fillmore’s system, for example, it is a complete accident that a preposition like English to shows up as both GOAL (He went to New York.) and DATIVE/EXPERIENCER (New York appeals to him.). This is a serious loss of descriptive adequacy, because the same two relations (GOAL and DATIVE/EXPERIENCER) are realized by the same postposition in Japanese (ni), the same inflectional case affix in ancient Indo–European languages like Latin (dative case), the same case in non–Indo–European languages (Finnish allative case), and so on. When such a wide range of languages realizes ostensibly different relations in the same way, it is clear that the relations have something in common, and that a descriptively adequate theory of language must discover and formalize what that commonality is if it is to make revealing generalizations about natural language. That such generalizations must be made is indicated by sets of data like the following (an example of literal motion toward a place occurs in the a sentences; of non–literal motion in the b sentences; of no perceptible motion at all, but rather of the person affected in the c sentences):

(33) English (same preposition to):

a. She drove the car to New York. (NOTE: A question like Where did she drive the car? is completely acceptable and asks about literal motion toward some unknown place.)

b. She gave the book to him. (NOTE: To him cannot be the answer to a question like Where did she give the book?; in fact, such questions are marginal, at best.)

c. The book appeals to him. (NOTE:. *Where does the book appeal?)

(35) Latin (same grammatical case DATIVE):

a. Hostes finibus (DATIVE) appropinquant. (Caesar)
   enemy border approaches
   The enemy approaches the border.

b. Litteras mihi (DATIVE) nuntius reddidit. (passim)
   letter to me messenger delivered
   The messenger delivered a letter to me.

c. Mihi (DATIVE) placet. (passim)
   to me it pleases
   It pleases me.
(36) Sanskrit (same grammatical case DATIVE):

a. *r~j~ van~ya* (DATIVE) pratisthati. (passim)
   king forest sets out
   The king sets out for the forest.

b. *mahyam* (DATIVE) pustakam dehi. (passim)
   to me book give
   Give me the book.

c. *rocate viprebyah* (DATIVE). (passim)
   it is pleasing to the Brahmans
   It is pleasing to the Brahmans.

(37) Japanese (same postposition *ni*):

   Mary Tokyo–to went
   Mary went to/toward Tokyo.

   Mary teacher–to letter writes
   Mary writes a letter to the teacher.

c. *John–ni eiga–ga omoshiroi*
   John to movie is interesting
   The movie is interesting to John.

In RG, case relations like GOAL, EXPERIENCER, SOURCE, AGENT etc. are actually categorial labels for constellations of semantic features. The commonality in GOAL and EXPERIENCER is the feature [+CONJUNCTURAL] which, roughly speaking, denotes association or union; the commonality in SOURCE and AGENT (and all the examples in (32)) is [+DISJUNCTURAL], which, again roughly speaking, denotes dissociation or separation. Therefore, the use of one thematic marker (preposition, postposition, grammatical case, etc.) for a variety of thematic relations can be attributed to the presence of identical features in those relations. This approach overcomes the loss of descriptive adequacy that all the theories of case relations mentioned above have shared. In those systems, the common features associated with thematic relations are not expressible, and it becomes a complete accident that the same marker is used across relations.

The loss of descriptive adequacy in past theories of case grammar leads to a loss of explanatory adequacy as well. It is very important that work in semantics, like all work in grammatical description, be generalized across analyses. The study of thematic relations involves one area of semantics. The descriptions used in this area must be relatable to descriptions used in other areas.
of semantics and to the whole grammar in general. But a theory such as Fillmore’s case grammar is not easily relatable to other work. For example, in an attempt to represent semantic relations among different expressions, researchers have constructed semantics networks, which are systems of connections that link together expressions from the same semantic field, such as color terms (red, puce, dye, etc.), or animal categories (domestic animals, mammals, animals that live in water, etc.) or expressions of separation (from, expel, source, etc.). Such semantic networks have been widely studied in the computer representation of language. But thematic relations like SOURCE and GOAL cannot be related in any direct way to the concepts which form such semantic networks, as we will see when we consider semantic networks below.

Further, concepts like SOURCE and GOAL cannot be related to concepts used in other semantic descriptions. For example, Roger Schank has proposed a set of semantic primitives out of which meanings can be described. One of his primitives is EXPEL, which refers to the expulsion of an object from the body of an animal; EXPEL is part of the meaning of verbs like sweat, spit, and cry. Another of Schank’s primitives is INGEST, which refers to the taking in of an object; INGEST is part of the meaning of verbs like eat, smoke, and breathe. Clearly, EXPEL is related to SOURCE and INGEST is related to GOAL. But Fillmore’s theory and Schank’s theory are stated in such a way that this relationship cannot be precisely specified.

In short, there is little transportability between these systems, so that the valuable insights of each cannot be gathered into one framework. Yet, the grammatical facts of natural language, in particular, the distribution of thematic markers, clearly indicate that there must be a connection between thematic relations and semantic fields in general. That is, the same feature which shows up in relations like SOURCE and AGENT ([+DISJUNCTURAL], e.g., from) should form part of the definition of words like aversion, deprive, empty, and so on; and, that feature should also show up in the definition of a primitive like EXPEL if a theory contains such a primitive. Similarly, the same feature that shows up in relations like GOAL and EXPERIENCER ([+CONJUNCTURAL], e.g., to) should form part of the definition of words like inclination, supply, fill, and the like and show up in a putative primitive like INGEST.

This feature-based approach to thematic relations provides an explanation for why the same groupings of markers occur repeatedly in natural languages. Additionally, since features like [+DISJUNCTURAL] and [+CONJUNCTURAL] can be directly defined in terms of human and machine perceptual systems, this approach also specifies the connection between perception and language. Any system which does not make this connection fails to attain explanatory adequacy.

The central thesis of RG semantics, therefore, is that thematic relations that are [–PST] are metaphors for those that are [+PST], so that the same features that distinguish and relate the latter group are employed in distinguishing and relating the former. Furthermore, we will see that thematic relations like SOURCE and AGENT are categorial abbreviations for constellations of semantic features, just as syntactic categories like NOUN and VERB are abbreviations for constellations of syntactic features. Lastly, we will see that the semantic features from which complex semantic categories are built are features that can be grounded in perception (human or machine).
4.12 POSITIONAL THEMATIC RELATIONS IN RG

We began the discussion of thematic relations by making a distinction between expressions which indicate positional relations like *He ran from his office* and those which do not like *He died from overexposure*. To this, we must add a fundamental breakdown between those positional relations which refer to position in time [+TEMPORAL] and those which refer to position in space [–TEMPORAL]. We can loosely define these features as follows:

(33) a. [+POSITIONAL] ([+PST, ±TMP]): having the primary focus on location, orientation, or movement in space or time, e.g., *He went FROM CALIFORNIA TO NEW YORK, He remained FROM SUNRISE TO SUNSET.*

b. [–POSITIONAL] ([–PST]): not having the primary focus on location, orientation, or movement in space or time, e.g., *FROM MY DESCRIPTION, he believes the movie will appeal TO HIM.*

(34) a. [+TEMPORAL] ([+PST, +TMP]): focusing on time, e.g, *He remained FROM SUNRISE TO SUNSET.*

b. [–TEMPORAL] ([+PST, –TMP]): focusing on place, e.g., *He went FROM CALIFORNIA TO NEW YORK*

Given a perceptual apparatus (human or machine), these definitions can be made very precise. For example, a computer equipped with a vision system and an internal clock can assign specific values to each of these features: the definition of [+PST] relations involving movement can be equated with changes in positional vectors over time; the definition of [+PST] relations not involving movement can be equated with a lack of change in positional vectors over time; the definition of [–PST] relations can be equated with the lack of a positional vector altogether; and so on. Thus, the features can be used to bridge the gap between the concrete (measurable, literal) and the abstract (metaphorical), a very important objective in semantic analysis.

The vector components for space include values of length, width and depth although spatial relations do not always refer to all three components. For example, a region may be viewed as a surface in examples like *They are on the lawn*, where the depth of the lawn is not relevant. On the other hand, a region can also be viewed as an area in examples like *They are in the lawn*, where the depth is relevant. Compare also *They are on the bed* and *They are in the bed*; *Look at the smudge on the mirror* and *Look at your reflection in the mirror*; *The ants are on the floor* and *The termites are in the floor.*

4.13 SOME BASIC FEATURE DISTINCTIONS
Within the compass of positional relations, languages make a fundamental distinction between
relations that involve three dimensions and those that do not, e.g., in English, the difference between
in and on. We will specify this distinction as first and second order positional arguments as follows:

(35) 

\([\pm \text{FIRST ORDER}] ([\pm \text{FST}])\).

a. \([+\text{FST}]:\) Thematic relations which are \([+\text{PST}, +\text{FST}]\) express relationships relative
to a point, line or surface. Depth is not involved so that “surface” refers to a region
with only length and width.

Examples: on the table, off the table, at the door; on Tuesday, at six o’clock.

b. \([-\text{FST}]\) (SECOND ORDER): Thematic relations which are \([+\text{PST}, –\text{FST}]\) express
relationships relative to area or volume. Depth is involved so that “area” refers to
a region with length, width, and height; compare He is on the field (surface) versus
He is in the field (area).

Examples: in the room, out of the office; in March, out of office hours.

Within each of these categories, natural languages have positional markers to indicate whether there
is contact or lack of contact between the object and the location. If the location is a container, e.g.,
a building, then part of the container includes its interior space; hence, anything within that interior
space is viewed as being in contact with a part of the container. This detail, which we will discuss
in Chapter Two, is crucial to understanding the possible meaning of sentences like The balloon
floated around in the smoke-filled room and She put the (porcelain) elephant into her purse. We
will express the feature of contact with the following opposition:

(36) 

\([\pm \text{PROXIMAL}] ([\pm \text{PRX}])\).

a. \([+\text{PRX}]:\) involving contact between the object and the location.

Examples: on the floor, in the drawer; on Tuesday, in March.

b. \([-\text{PRX}]:\) not involving contact between the object and the location.

Examples: at the door, near his office; around noon, near July 4.

Thematic relations that are \([+\text{PST}, \pm \text{FST}, \pm \text{PRX}]\) do not necessitate motion, although motion is
possible, e.g., He walked out of his office versus He is out of his office. Such an option is not
available with all positional markers. For example, positional uses of to typically involve movement
of some kind (cf. He has never been to Europe, where the use of to necessitates interpreting been
as gone). Positional uses of to without movement as in They stood back to back are less common.
To account for the differences between motion and rest, as well as the direction of motion (to versus from) and the location of rest (on/in versus off of/out of), we posit the feature oppositions CONJUNCTURAL ([±CNJ]) and DISJUNCTURAL ([±DSJ]). Informally, we say that disjunctural relations ([+DSJ]) are defined as those that involve parting, dissociation, withdrawal, detachment, or separation. Conjunctural relations ([+CNJ]) are defined as those that involve joining, association, advance, attachment, or union. Significantly, in any movement, there is simultaneously both a withdrawal from one location (the SOURCE) and an advance to some other location (the GOAL). In actual usage, one or the other is generally emphasized: depart from, advance to, go from, go to, etc. In cases of rest like the cup is on the table, neither parting nor joining is involved.

These two interacting feature oppositions, [±CNJ] and [±DSJ], can be used to account for the differences between movement and rest in space or time as follows:

(37) IN VolVING TWO LOCATIONS AND IN VolVING MOVEMENT:

a. [–DSJ, +CNJ]: involving movement toward one location in space or time, the SOURCE location being understood or not mentioned:

   Examples: He went as far as/up to the river; He’ll be here until/up to Friday.

b. [+DSJ, –CNJ]: involving movement away from one location in space or time, the GOAL being understood or not mentioned:

   Examples: He left from Detroit; He’s been here since Easter.
INvolving one location and not involving movement:

a. \([-\text{DSJ}, -\text{CNJ}\)]: not involving movement and relating to one location only, specifically the place where some object is located:

Examples: *He is in Europe; The meeting is in June.*

b. \([+\text{DSJ}, +\text{CNJ}\)]: not involving movement and relating to one location only, specifically the place where some object is not located. Temporal examples like *out of season* are uncommon.

Examples: *He is away from his desk, out of the office.*

Notice that, for movement to occur, at least two locations are required. In \([-\text{DSJ}, -\text{CNJ}\)] relations, only one location need be mentioned; the other is implied and could be mentioned (*He departed from the city (for the country)*). However, in \([+\text{DSJ}, +\text{CNJ}\)] cases, any second implied location cannot be mentioned unless a coordinating conjunction or comma intonation is used between the two, otherwise, the object appears to be in two places at once:

(39) a. *It is now off the wall on the table.*
   b. It is now off the wall and on the table.

The last feature opposition to be presented is one needed to capture the distinction between pinpointed and widespread positional expressions, e.g., *on* versus *over*, and *in* versus *throughout*. We therefore add (40).

(40) \([\pm\text{EXTENSIONAL}] ([\pm\text{EXT}])\)

a. \([+\text{EXT}]\): emphasizing the extent of space or time.

Examples: *over the floor, all around the house; over the weekend, all during February.*

b. \([-\text{EXT}]\): emphasizing a small and highly circumscribed space or time.

Examples: *on the horse, in the box; on Monday, in July.*

A summary of examples of the positional thematic relations is given in Figure Nine.
### FIGURE NINE I: PROXIMAL POSITIONAL THEMATIC RELATIONS ([+PST, –TMP, +PRX])

<table>
<thead>
<tr>
<th>–EXT</th>
<th>–FST</th>
<th>+EXT</th>
<th>–FST</th>
</tr>
</thead>
<tbody>
<tr>
<td>–DSJ</td>
<td>+FST</td>
<td>–FST</td>
<td>+FST</td>
</tr>
<tr>
<td>–CNJ</td>
<td>LOCATIVE1</td>
<td>LOCATIVE2</td>
<td>LOCATIVE3</td>
</tr>
<tr>
<td></td>
<td>on, on top of</td>
<td>in, within</td>
<td>over, on</td>
</tr>
<tr>
<td></td>
<td>He was on the horse.</td>
<td>He was in the pool.</td>
<td>He had the patch over his eye.</td>
</tr>
<tr>
<td>+DSJ</td>
<td>ABSENTIVE1</td>
<td>ABSENTIVE2</td>
<td>ABSENTIVE3</td>
</tr>
<tr>
<td>+CNJ</td>
<td>off, off of</td>
<td>out of</td>
<td>off, off of</td>
</tr>
<tr>
<td></td>
<td>He was off the horse.</td>
<td>He was out of the pool.</td>
<td>He had the patch off his eye.</td>
</tr>
<tr>
<td>–DSJ</td>
<td>ILLATIVE1</td>
<td>ILLATIVE2</td>
<td>ILLATIVE3</td>
</tr>
<tr>
<td>+CNJ</td>
<td>on, onto</td>
<td>into, in</td>
<td>over, on</td>
</tr>
<tr>
<td></td>
<td>He got on the horse.</td>
<td>He jumped into the pool.</td>
<td>He put the patch over his eye.</td>
</tr>
<tr>
<td>+DSJ</td>
<td>ELATIVE1</td>
<td>ELATIVE2</td>
<td>ELATIVE3</td>
</tr>
<tr>
<td>–CNJ</td>
<td>off, off of, from</td>
<td>out of, from</td>
<td>off, off of, from</td>
</tr>
<tr>
<td></td>
<td>He got off the horse.</td>
<td>He jumped out of the pool.</td>
<td>He took the patch off his eye.</td>
</tr>
</tbody>
</table>

### FIGURE NINE II: NONPROXIMAL POSITIONAL THEMATIC RELATIONS ([+PST, –TMP, –PRX])

<table>
<thead>
<tr>
<th>–EXT</th>
<th>–FST</th>
<th>+EXT</th>
<th>–FST</th>
</tr>
</thead>
<tbody>
<tr>
<td>–DSJ</td>
<td>+FST</td>
<td>–FST</td>
<td>+FST</td>
</tr>
<tr>
<td>–CNJ</td>
<td>ADESSIVE1</td>
<td>ADESSIVE2</td>
<td>ADESSIVE3</td>
</tr>
<tr>
<td></td>
<td>near, at</td>
<td>near, at</td>
<td>along, near, at</td>
</tr>
<tr>
<td></td>
<td>He was near the tree.</td>
<td>The balloon was near the ceiling.</td>
<td>The signs were along the road.</td>
</tr>
<tr>
<td>+DSJ</td>
<td>ABESSIVE1</td>
<td>ABESSIVE2</td>
<td>ABESSIVE3</td>
</tr>
<tr>
<td>+CNJ</td>
<td>away from, from</td>
<td>away from, from</td>
<td>away from, from</td>
</tr>
<tr>
<td></td>
<td>He was away from the tree.</td>
<td>The balloon was away from the ceiling.</td>
<td>The signs were away from the road.</td>
</tr>
<tr>
<td>–DSJ</td>
<td>ALLATIVE1</td>
<td>ALLATIVE2</td>
<td>ALLATIVE3</td>
</tr>
<tr>
<td>+CNJ</td>
<td>to, toward</td>
<td>to, toward</td>
<td>along, near</td>
</tr>
<tr>
<td></td>
<td>He walked toward the tree.</td>
<td>The balloon floated toward the ceiling.</td>
<td>He put the signs along the road.</td>
</tr>
<tr>
<td>+DSJ</td>
<td>ABLATIVE1</td>
<td>ABLATIVE2</td>
<td>ABLATIVE3</td>
</tr>
<tr>
<td>–CNJ</td>
<td>away from, from</td>
<td>away from, from</td>
<td>away from, from</td>
</tr>
<tr>
<td></td>
<td>He walked away from the tree.</td>
<td>The balloon floated away from the ceiling.</td>
<td>He put the signs away from the road.</td>
</tr>
</tbody>
</table>
Figure Nine reveals an important advantage to having two interacting features (DSJ and CNJ) with two values (plus and minus) to account for positional relations, namely, it affords us a simple way of accounting for the many markers that spread over both STATIVE (rest) and NONSTATIVE (motion) relations. For example, *from* is either [+DSJ, +CNJ], that is, stative, as in *he is from Detroit*, or [+DSJ, –CNJ], that is, nonstative, as in *he moved from Detroit*. Using the same "–notation from phonology (Page 50), we can generalize this as [+DSJ, "CNJ].

A system that begins with [±STATIVE] (or [± MOTION]) as primitives and then attempts to categorize markers in terms of these primitives misrepresents the facts. A marker like *from* is essentially separative, i.e., [+DISJUNCTURAL], however one wishes to label this; it is not essentially either a marker of motion or a marker of rest. Interestingly, English *to* is not essentially [+CONJUNCTURAL]; rather, its basic feature is [–DISJUNCTURAL]. There are LOCATIVE uses (it is stuck to the wall, they are cheek to cheek) and ADESSIVE uses (his back is to the wall, they stood to one side, it lies to the north). We find similar data in other languages. In French, for example, *en* is used for [–DISJUNCTURAL] expressions: *aller en France* (‘go to France’), *entrer en ville* (‘go into town’), *vivre en Angleterre* (‘live in England’).

In general, thematic markers in the world’s languages have both stative and nonstative uses, and are not primarily associated with either motion or rest though this certainly does occur. Crucially, even when this does occur, the relations are still best expressed along the lines of Figure Nine. For example, many German prepositions (*an, auf, hinter*, etc.) are used with the dative case for rest and the accusative case for motion. This simply means that the dative is associated with ["DSJ, "CNJ] and the accusative with ["DSJ, –"CNJ]. What we do not find in natural language are common examples where markers are confined to motion or rest and within each category have both disjunctural and conjunctural meanings, i.e., a marker that means either motion to or motion from, or one that means either rest in or rest out of. For these reasons, concepts like *stative* are derivative, not primitive, in the system described here.

In Figure Nine notice that English frequently neutralizes features so that the same preposition is used throughout a row. This is, in fact, one of the motivations behind the RG system. One needs to be able to both pinpoint and generalize prepositional usage. In some instances, there are fine distinctions available: *in, on, over, throughout*. In others, the same preposition covers a wide range of cases, e.g., *from* and *to*. In this regard, English is typical of the world’s languages, though, again, as the examples from French and German above indicate, different languages will distribute prepositions over different feature spaces.

The most obvious positional features that have nonpositional correlates are the four DSJ/CNJ pairs of Figure Nine in both their PROXIMAL and NONPROXIMAL variations. Certain nonpositional thematic relations are viewed by speakers as involving a conjunction (to and into), others a disjunction (*from* and *out of*), and still others a combination of disjunction and conjunction (*off* and *away*) or lack of both (*on* and *in*). Accordingly, the same prepositions that occur in the positional relations show up in the nonpositional ones. We have very clear cut examples like (50) though (53).

(50) a. He turned into a street. [+PST]
b. He turned into a frog.       [-PST]

(51) a. He leaned against them.      [+PST]
b. He fought against them.      [-PST]

(52) a. They roamed about the city.  [+PST]
b. They talked about the city.  [-PST]

(53) a. They live by water.          [+PST] or [-PST]
b. They travel by water.        [+PST] of [-PST]

4.14 NONPOSITIONAL THEMATIC RELATIONS

We have argued above that the nonpositional thematic relations are metaphors for their positional counterparts. To repeat, a [+PST, +DSJ] theme expresses literal (measurable) separation, whereas a [–PST, +DSJ] theme expresses figurative separation. A theme like SOURCE is [+PST, +DSJ]; one like CAUSE is [–PST, +DSJ]. Similarly, a [+PST, –DSJ] theme expresses literal (measurable) union, whereas a [–PST, –DSJ] theme expresses figurative union. Thus, GOAL is [+PST, –DSJ]; EXPERIENCER is [–PST, –DSJ].

A summary of the nonpositional thematic relations is given in Figure Ten. As Figures Nine and Ten indicate, case relations like ILLATIVE, AFFECTIVE (EXPERIENCER), EFFECTIVE (AGENT), etc. are actually categorial labels for constellations of semantic features in RG. Thus, semantics exactly parallels syntax and phonology. Each one of the semantic features can be precisely defined in terms of human (or machine) vision.

The commonality in ILLATIVE, ALLATIVE and AFFECTIVE is the feature [+CNJ] which denotes association or union; the commonality in ELATIVE, ABLATIVE, and EFFECTIVE (and all the examples in (32)) is [+DSJ], which denotes dissociation or separation. Therefore, the use of one thematic marker (preposition, postposition, grammatical case, etc.) for a variety of thematic relations can be attributed to the presence of identical features in those relations. This approach overcomes the loss of descriptive adequacy that all the theories of case relations mentioned above have shared. In those systems, the common features associated with thematic relations are not expressible, and it becomes a complete accident that the same marker is used across relations.
### FIGURE TEN I: PROXIMAL NONPOSITIONAL THEMATIC RELATIONS ([–PST, +PRX])

<table>
<thead>
<tr>
<th>–EXT</th>
<th>–FST</th>
<th>+EXT</th>
<th>–FST</th>
</tr>
</thead>
<tbody>
<tr>
<td>+FST</td>
<td>–FST</td>
<td>+FST</td>
<td>–FST</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>–DSJ</th>
<th>–CNJ</th>
<th>POSSESSOR</th>
<th>ATTRIBUTIVE</th>
<th>COMPARATIVE</th>
<th>CIRCUMSTANTIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø</td>
<td></td>
<td>He knows French.</td>
<td><em>in, with, of</em> He is a man with/of many hopes.</td>
<td><em>like, with, to</em> He is similar to his father. He is like his father.</td>
<td><em>with</em> He does everything with haste.</td>
</tr>
<tr>
<td>+DSJ</td>
<td>+CNJ</td>
<td>NONPOSSESSOR</td>
<td>NONATTRIBUTIVE</td>
<td>NONCOMPARATIVE</td>
<td>NONCIRCUMSTANTIAL</td>
</tr>
<tr>
<td>Ø</td>
<td></td>
<td>He doesn’t know French.</td>
<td><em>out of, without, from</em> He is a man without any hopes.</td>
<td><em>unlike, from</em> He differs from his father. He is unlike his father.</td>
<td><em>without</em> He does everything without haste.</td>
</tr>
<tr>
<td>–DSJ</td>
<td>+CNJ</td>
<td>AFFECTIVE</td>
<td>RESULTATIVE</td>
<td>REFERENTIAL</td>
<td>CONSECUTIVE</td>
</tr>
<tr>
<td>to</td>
<td></td>
<td>Al taught French to Ed.</td>
<td><em>into</em> Al turned Ed into an optimist.</td>
<td><em>for</em> For her, the price is right.</td>
<td><em>for</em> He’s too ill for work.</td>
</tr>
<tr>
<td>+DSJ</td>
<td>–CNJ</td>
<td>EFFECTIVE</td>
<td>COMPOSITIONAL</td>
<td>EXPEDIENTIAL</td>
<td>CAUSAL</td>
</tr>
<tr>
<td>from, by</td>
<td>Ed learned French from Al.</td>
<td><em>out of, from</em> Ed made a optimist out of Al.</td>
<td><em>by</em> He got there by plane.</td>
<td><em>from, of</em> He died from the extreme cold.</td>
<td></td>
</tr>
</tbody>
</table>
The definitions for the major nonpositional thematic relations are as follows:

(41) EFFECTIVE (EFC): The animate being, missile, or force typically perceived as bringing about the action identified in the predicate (variously called AGENTIVE, AGENT, and FORCE).

BILL killed the bug./The bug was killed BY BILL.
The BOULDER totaled the car./The car was totaled BY THE BOULDER.
THE TORNADO destroyed the crops./The crops were destroyed BY THE TORNADO.

(42) COMPOSITIONAL (CPS): The material or things out of which something is composed; the product retains the original ingredients (related to INALIENABLE POSSESSION).

They crafted the vase OUT OF SILVER.
The cabinets are made OF WOOD.
The oak grew OUT OF AN ACORN.

(43) EXPEDIENTIAL (EXP): The means by which something is done.

We went BY CAR.
BY COUNTING TO TEN, she manages not to abuse the kids.

(44) CAUSAL (CAU): The entity which expresses the cause of the action or state identified in the predicate.

He died FROM SMOKING.  He died OF CANCER.
He collapsed FROM THE HEAT.
He acted OUT OF GUILT.

(45) EFFERENTIAL (EFR): The quasi–positional entity from which an action emanates. Often called SOURCE by others.

John received/bought the car FROM BILL.
BILL gave/sold the car to John.

(46) ORIGINATIVE (ORG): The entity or condition from which something is transformed (related to ALIENABLE POSSESSION).

He got himself OUT OF DEBT.
He detoxed FROM HEROIN.
(47) DIFFERENTIAL (DIF): The degree of difference expressed in a contrast.

He won BY A MILE.
They are distinguished BY MANY CHARACTERISTICS.

(48) DELIMITITIVE (DEL): Delimitive themes specify the condition(s) from which something results; hence, they are classified as [+DISJUNCTURAL]. Most delimitive expressions in English are clauses introduced by if.

His sister will care for his children, IF HE DIES.
IN THE EVENT OF HIS DEATH, his sister will care for his children.

(49) AFFECTIVE (AFC): The animate or inanimate entity directly affected by the state or action identified in the predicate. Variously called EXPERIENCER or DATIVE by others.

JOHN feels that Bill will win.
John killed BILL./BILL died.
John melted THE ICE./ THE ICE melted.
He put the money IN HIS POCKET.

(50) RESULTATIVE (RES): The product created from some materials and retaining the original ingredients (related to INALIENABLE POSSESSION).

The wove the straw INTO BASKETS.
THE BASKETS were made out of straw.
She baked (the ingredients into) A CAKE.
The acorn grew INTO AN OAK.
He invented THE TELEPHONE.

(51) REFERENTIAL (REF): The person or thing in reference or relation to which something occurs.

John will always be a hero TO BILL (AS FAR AS BILL IS CONCERNED).
A term paper is optional FOR UNDERGRADUATES.
He is smart FOR HIS AGE.
Bill is a stickler FOR DETAILS.

(52) CONSECUTIVE (CNS): The result or consequences of an action or state.

He became too sick TO/FOR WORK.
He became so sick THAT HE COULDN’T WORK.
It’s too early FOR DINNER.
He has enough qualifications/qualifies FOR THE JOB.
(53) **AFFERENTIAL (AFR):** The quasi–positional entity to which an action is directed. Often called GOAL by others.

Bill sold the car TO JOHN./Bill sold JOHN the car.
JOHN received/bought the car from Bill.
He gave a new coat of paint TO THE HOUSE./He gave THE HOUSE a new coat of paint.

(54) **TERMINATIVE (TRM):** The entity or condition into which something is transformed (related to ALIENABLE POSSESSION).

He came INTO A FORTUNE./He became WEALTHY.
He got himself INTO DEBT.
He withdrew INTO DRUGS AND ALCOHOL.

(55) **BENEFACTIVE (BEN):** The entity, usually animate, for whose benefit or on whose behalf the action or state identified in the predicate occurs (see below, Endnote ?).

Bill bought a gift FOR JOAN/bought JOAN a gift.
JOAN was bought a gift by Bill.

(56) **PURPOSIVE (PUR):** The entity which specifies the purpose of or reason for the action or state identified in the predicate.

They trained him FOR THE JOB/TO DO THE JOB.
He entered the competition FOR THE MONEY/TO GET MONEY.
They dug a hole FOR WATER/TO GET WATER.
She jumped FOR JOY.
She did it FOR MANY REASONS.
They rewarded him FOR HIS RESEARCH.

### 4.15 DIMENSIONAL THEMATIC RELATIONS

In addition to the feature specifications given in the above figures, the RG system recognizes another set of thematic relations of a DIMENSIONAL nature. These are defined as follows and illustrated comparatively in Figure Eleven:

(57) **COMPONENTIAL1:** the whole (holonym) in a part–whole relationship.

a. A ROOM has a ceiling.
b. A HOUSE has a roof.

(58) **COMPONENTIAL2:** the part (meronym) in a part–whole relationship.
a. A CEILING is part of a room.
b. A ROOF is part of a house.

(59) TYPOLOGICAL1: the class (hyponym) in a member–class relationship.

a. The class MAMMAL contains primates.
b. The class BIRD contains robins.

(60) TYPOLOGICAL2: the member (hyponym) in a member–class relationship.

a. PRIMATES are mammals.
b. ROBINS are a type of bird.

Since the relationships may involve either inalienable or alienable characteristics and nonpossession as well as possession, we have the sixteen relationships specified in Figure Eleven.

<table>
<thead>
<tr>
<th>FIGURE ELEVEN: CLASSIFICATORY THEMATIC RELATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>–EXT</td>
</tr>
<tr>
<td>+FST</td>
</tr>
<tr>
<td>COMPONENTIAL1</td>
</tr>
<tr>
<td>+PRX</td>
</tr>
<tr>
<td>An arm is a BODY PART.</td>
</tr>
<tr>
<td>+PRX</td>
</tr>
<tr>
<td>The neck is not part of THE HEAD.</td>
</tr>
<tr>
<td>–PRX</td>
</tr>
<tr>
<td>A flower is part of A BOUQUET.</td>
</tr>
<tr>
<td>–PRX</td>
</tr>
<tr>
<td>Hawaii is not part of CONTINENTAL USA.</td>
</tr>
</tbody>
</table>

Notice that any particular characteristic of an object might be expressed in several different ways. For example, in (61a), black is treated as an inalienable characteristic while in (61b) it is treated as a class.
(61)  a. ATTRIBUTIVE: He is black.
    b. TYPOLOGICAL: He is a black.

Similarly, in (62a) poor is treated as an alienable characteristic; in (62b) it is treated as a class.

(62)  a. ASSOCIATIVE: He is poor.
    b. TYPOLOGICAL: The poor need assistance.

Since the same characteristic can fit more than one of our proposed thematic relations, it might appear that the system we have described is unnecessarily redundant or complex. But this is not the case. Different individuals classify and define the same things in numerous, diverse ways. For example, one can classify United States judges as members of a particular branch of government or as nonmembers of other branches:

(63)  a. Judges are part of the judicial branch of government.
    b. The judicial branch of government includes judges.

(64)  a. Judges are not part of the legislative branch of government.
    b. The legislative branch of government does not include judges.

Further, some speakers may view (63) as an INALIENABLE classification, others as ALIENABLE, and these particular assignments are relatively stable. Consider the possible assignments when attempting to classify a word like teenager. Assignments into different cells of the figures above is often a matter of personal beliefs, habit and experience. For example, in a random poll, it was found that most students in an introductory linguistics class did not view the neck as part of the head; however, several did, some with great conviction: “Well, after all, the neck goes with the head in decapitation,” one student remarked ominously.

Lastly, observe that care must be taken in comparing meanings. For example, the assignment of the number B to the class of irrational numbers and the description of an individual as a irrational person do not employ the same meaning of irrational:

(65)  a. TYPOLOGICAL: Pi (B) is irrational.
    b. CIRCUMSTANTIAL: John is irrational.

The feature opposition [±DIMENSIONAL] is the last semantic feature we will consider. This opposition, in addition to the others discussed previously, will figure prominently in our discussion of semantic networks below.
4.16 THE PERCEPTUAL BASIS OF SEMANTICS

Our discussion of semantics has centered on the hypothesis that thematic relations such as EFFECTIVE, AFFECTIVE, ELATIVE, ILLATIVE, etc. are actually categorial labels for constellations of semantic features. Each one of the semantic features can be precisely defined in terms of human (or machine) perception. Given this approach, the use of one thematic marker (preposition, postposition, grammatical case, etc.) for a variety of thematic relations can be attributed to the presence of identical features in those relations.

This approach overcomes the loss of descriptive adequacy that all the theories of case relations mentioned in Chapter One have shared. In those systems, the common features associated with thematic relations are not expressible, and it becomes an accident that the same marker is used across relations. Further, as we saw, there was a loss of explanatory adequacy as well.

The theory outlined and justified above overcomes these deficiencies. In addition to explicating the cross–categorial uses of thematic markers, the semantic features serve as the basis of a knowledge representation system.

As Figures Nine and Ten reveal, different clusters of features define different thematic relations. A feature cluster such as \([+PST, –TMP, –DIM, –EXT, +FST, +PRX, –DSJ, –CNJ]\) has the following meanings:

\[(66)\]

\[\begin{array}{ll}
\text{a. } & +PST \quad \text{POSITIONAL} \quad \text{IN Volving LOCATION} \\
\text{b. } & –TMP \quad \text{TEMPORAL} \quad \text{LOCATION IN SPACE, NOT TIME} \\
\text{c. } & –DIM \quad \text{NONDIMENSIONAL} \quad \text{NOT CONCERNED WITH MEASUREMENT} \\
\text{d. } & –EXT \quad \text{NONEXTENSIONAL} \quad \text{PINPOINTED LOCATION} \\
\text{e. } & +FST \quad \text{FIRST ORDER} \quad \text{LOCATION RELATIVE TO POINT, LINE, OR SURFACE} \\
\text{f. } & +PRX \quad \text{PROXIMAL} \quad \text{INVOLVING CONTACT} \\
\text{g. } & –DSJ \quad \text{NONDISJUNCTURAL} \quad \text{NOT EMPHASIZING PARTING} \\
\text{h. } & –CNJ \quad \text{NONCONJUNCTURAL} \quad \text{NOT EMPHASIZING JOINING} \\
\end{array}\]

Thus, the cluster of features in (66) defines the relation LOCATIVE1 (see Figure Nine on Page 183) realized in English in such phrases as \(\text{on walls}\) or \(\text{on Mars}\) as they would occur in sentences like \(\text{Pictures are found on walls}\) and \(\text{Martians are found on Mars}\).

Changing one or more feature specifications produces different thematic relations as follows:

\[(67)\] \([+PST, +TMP, +DIM, –EXT, +FST, +PRX, –DSJ, –CNJ]\) defines expressions like \(\text{on Sunday}\) (still LOCATIVE1) as it might occur in a sentence like \(\text{Church services often occur on Sunday}\).

\[(68)\] \([+PST, –TMP, –DIM, –EXT, –FST, +PRX, –DSJ, –CNJ]\) defines expressions like \(\text{in water}\) (LOCATIVE2), in sentences like \(\text{Fish are found in water}\).
(69) \([-\text{PST}, -\text{TMP}, -\text{DIM}, -\text{EXT}, -\text{FST}, +\text{PRX}, -\text{DSJ}, -\text{CNJ}]\) defines expressions like *in Latin* (ATTRIBUTIVE), which underlie sentences like *The poem is in Latin.*

(70) \([-\text{PST}, -\text{TMP}, +\text{DIM}, -\text{EXT}, -\text{FST}, +\text{PRX}, -\text{DSJ}, -\text{CNJ}]\) defines COMPONENTIAL2 expressions like *A wing is part of a bird* which underlie sentences like *All birds have wings.*

As these examples show, sets of semantic features specify individual thematic relations. On a higher level of organization, that of knowledge representation, sets of thematic relations can be used to construct a semantic network.

4.17 SEMANTIC NETWORKS

Semantic networks consist of nodes and links. For example, they might contain a node FISH–1 (‘cold–blooded aquatic vertebrate’) and FISH–2 (‘attempt to catch FISH–1’). The node FISH–1 is connected to the node BODY_OF_WATER–1 (‘a body of water’) by a LOCATIVE2 link, thereby expressing the fact that fish are found in water. FISH–1 is also connected to TROUT–1 by a TYPOLOGICAL2 link indicating that one type of fish is a trout. Further, since TROUT–1 is a type of FISH–1, TROUT–1 “inherits” the LOCATIVE2 link to BODY_OF_WATER–1; thus, TROUT–1 are found in BODY_OF_WATER–1.

The difficulty with semantic networks available in the literature is that they lack independent criteria for specifying what can be a link in a network. As we saw in Chapter One, this is not true of the present system. Each link in the network can be defined as a cluster of semantic features, that is, as a thematic relation; and each node is no more that a sum of the links it has to other nodes. For example, consider (71), (72), and (73), where each arrow indicates a pointer (link) from one node in a network to another node, and where the thematic relation left of the arrow names the pointer.

<table>
<thead>
<tr>
<th>NODE ONE</th>
<th>POINTER</th>
<th>NODE TWO</th>
</tr>
</thead>
<tbody>
<tr>
<td>(71)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. LIVING_THING–1</td>
<td>–TYP2</td>
<td>ENTITY–1</td>
</tr>
<tr>
<td>b. LIVING_THING–1</td>
<td>–EFC</td>
<td>REPRODUCTION–1</td>
</tr>
<tr>
<td>c. LIVING_THING–1</td>
<td>–EFC</td>
<td>INGESTION–1</td>
</tr>
<tr>
<td>d. LIVING_THING–1</td>
<td>–AFC</td>
<td>DEATH–1</td>
</tr>
<tr>
<td>e. LIVING_THING–1</td>
<td>–AFC</td>
<td>GROWTH–1</td>
</tr>
<tr>
<td>f. LIVING_THING–1</td>
<td>–IPS</td>
<td>LIFE–1</td>
</tr>
</tbody>
</table>

This list encodes the information that a LIVING_THING–1 is a type of ENTITY–1, that it can be an agent (EFC) of REPRODUCTION–1 and INGESTION–1, that it can experience (AFC) DEATH–1 and GROWTH–1, and that it is an inalienable possessor (IPS) of LIFE–1.

<table>
<thead>
<tr>
<th>(72)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ANIMAL–1</td>
<td>–TYP2</td>
<td>LIVING_THING–1</td>
</tr>
<tr>
<td>b. ANIMAL–1</td>
<td>–EFC</td>
<td>MOVEMENT–1</td>
</tr>
<tr>
<td>c. ANIMAL–1</td>
<td>–AFC</td>
<td>SLEEP–1</td>
</tr>
</tbody>
</table>
d. ANIMAL–1 —AFC —> SENSATION–1  
e. ANIMAL–1 —IPS —> SPONTANEITY–1  
f. ANIMAL–1 —APS —> HOME–1  

This list encodes the information that an ANIMAL is a type of LIVING_THING–1 which can be an agent (EFC) of MOVEMENT–1, which can experience (AFC) SLEEP–1 and SENSATION–1, and which inalienably possesses (IPS) SPONTANEITY–1 and alienably possesses (APS) HOME–1.

(73)  
a. HUMAN–1 —TYP2 —> ANIMAL–1  
b. HUMAN–1 —EFC —> SPEECH–1  
c. HUMAN–1 —EFC —> WRITING–1  
d. HUMAN–1 —EFC —> IDEA–1  
e. HUMAN–1 —EFC —> TOOL–1  
f. HUMAN–1 —EFC —> REASON–1  
g. HUMAN–1 —AFC —> JOY–1  
h. HUMAN–1 —IPS —> LANGUAGE–1  
i. HUMAN–1 —IPS —> KINSHIP–1  
j. HUMAN–1 —IPS —> RACE–1  
k. HUMAN–1 —APS —> JOB–1  
l. HUMAN–1 —APS —> SPOUSE–1  
m. HUMAN–1 —APS —> CLOTHING–1  
n. HUMAN–1 —APS —> NAME–1  
o. HUMAN–1 —APS —> TOOL–1  

This list encodes the information that a HUMAN–1 is a type of ANIMAL–1 which can be an agent (EFC) of SPEECH–1, WRITING–1, IDEA–1, TOOL–1, and REASON–1, which can experience (AFC) JOY–1, which inalienably possesses (IPS) LANGUAGE–1, KINSHIP–1, and RACE–1 and alienably possesses (APS) JOB–1, SPOUSE–1, CLOTHING–1, NAME–1 and TOOL–1.

The lists in (71) (73) are intended to encode information as people do; therefore, there are apparent redundancies. Notice for example that (73) specifies that humans own (APS) and use (EFC) tools. It is certainly possible for humans to use tools but not own any, e.g., some of one’s neighbors. It is also possible for humans to own tools but never use any of them.

More importantly, the information in examples like (73), which concerns the things humans can do, own, experience, use, etc., is not the type of information one normally finds in on–line semantic networks, which are primarily driven by COMPONENTIAL (HASA) and TYPOLOGICAL (ISA) links. Yet, the information in examples like (73) is crucial to developing a parser that can understand the ordinary use of language. Although people immediately realize that even a simple statement such as John killed the bug concerns a rather trivial and unremarkable event, computers do not.
EXERCISES FOR CHAPTER FOUR

In many ways, linguistics is grammatical detective work. It is knowing what questions to ask, which results to consider and which to dismiss, and how to arrive at the most generalized overall description. Remember that the underlying principles of language are logical, not arbitrary. But, as we have seen again and again, they are also hidden from obvious conscious notice.

1. One of the best clues to determining underlying thematic relations is the prepositions that show up in paraphrases. For example, consider what the case of the safe is in (i).

(i) The safe contains the jewels.

Determining underlying thematic relation (like determining part of speech) often benefits from considerations of meaning. However, there are also many pitfalls to relying on meaning alone. While it is useful to ask oneself what role the phrase the safe plays in (i), this is not the best way to begin. Of potentially greater reliability are paraphrases. Consider (ii).

(ii) The jewels are contained in the safe.

Since the preposition in shows up in the paraphrase, a good guess is that the N3 the safe in (i) is LOCATIVE. Of course, we could have a genuine exception here, a purely idiosyncratic and unpredictable usage. Contrary to popular belief, this is NOT usually the case.

Sometimes paraphrases with a particular verb are not possible. For example, there are no paraphrases with the verb fill in (iii) that realize the bucket as a prepositional phrase.

(iii) He filled the bucket with water.

On the other hand, we do have verbs like fill that involve the transference of something into something else. Consider (iv).

(iv) He poured the water into the bucket.

Given (iv), a good guess for the case of the bucket in (iii) is ILLATIVE. This guess receives support from inject which allows the complement structure of both (iii) and (iv), as we see in (v).

(v) He injected the patient with it.
   He injected it into the patient.

Using this method, determine the underlying thematic relations for all the underlined phrases (watch for ambiguities).
a. *Bill resembles Bob.*
b. *Mary knows the answer.*
c. *John acts weird.*
d. *Sue told Bill a lie.*
e. *Mary met a bachelor.*
f. *Kathy rode the horse.*

2. Another clue to determining underlying cases, is the form questioning and pronominalization take. Positional relations ordinarily are elicited by questions words like, *where* or *when*; they are replaceable by forms like *there* and *then*. Using these "tests" along with paraphrases, determine the underlying relations in the following phrases introduced by *on*:
   a. He put on the hat.
   b. He sat on the horse.
   c. He got on the plane.
   d. He insisted on the gin.
   e. They disagreed on the budget.
   f. They wrestled on the mat.

3. Using the above clues, determine the uses of *to* in the following:
   a. He objected to her.
   b. He submitted to her.
   c. He wrote to her.
   d. He appeals to her.
   e. He went to her.

4. What other tests than those in Exercise One and Two can you use to help determine underlying thematic relations?
5. Identify the thematic relations for each noun phrase in the following sentences (note ambiguities):

a. The burglar inserted the key into the lock.

b. The librarian shelved the books without her assistant.

c. The teacher read the story to the students with enthusiasm.

d. The cook from Paris cooked the meal.

e. The cook from Paris broiled the chicken.

f. The campus police are patrolling the corridors of buildings after dark in search of students.

g. The soccer game takes place at Troy High on Saturday.

h. The president elect is considered an honest man by many voters.

i. The clothes are lying on the bed in disarray.

j. Who put the glue in the toothpaste?

6. In English, thematic relations functioning in subject or direct object positions lose their prepositions. Compare the following:

a. The gardener sprinkled the flowers with water.

b. The gardener sprinkled the water onto the flowers.

c. The flowers were sprinkled with water by the gardener.

d. The water was sprinkled onto the flowers by the gardener.

In (a) and (b), the subject is EFC; in (c), the subject is AFC; in (d), the subject is ASC. Find as many different examples of thematic relations serving as subject as you can. Then, do the same for direct object.

7. How would CASE GRAMMAR describe the syntax of the following sentences?

a. The boy chopped down the tree with an axe.
b. John traveled from Greece to Rome.

c. Sally set the table for her mother.

d. In July, the harvest was ruined by rain.

e. Bill hates zucchini with a passion.

8. Say as much as you can, in as explicit a form as you can, about the syntax and semantics of following ambiguous sentences.

   a. The robot moved the patient with the nurse.

   b. The nurse moved the patient with a broken arm.

9. Identify the thematic relations introduced by the prepositions with and without in the following (as always, note ambiguities):

   a. He made it WITH HER.

   b. He made it WITH LOVE.

   c. He made it WITHOUT TOOLS.

   d. I met several people WITHOUT CHILDREN.

   e. A person WITH LONG SOBRIETY is reliable.

   f. He went WITH THE CHILDREN.

   g. The sidewalk is level WITH THE STREET.

   h. He did it WITH GUSTO.

   i. He punched her WITH HIS FIST.

   j. He is WITHOUT THE NECESSARY FUNDS.

10. The following uses of theABLATIVE case in Latin have been identified by the labels usually given by classical grammarians.

   a. THE ABLATIVE OF QUALITY:
Vir summo ingenio (ABL) est.
a man of the greatest genius he is
He is a man of the greatest genius.

b. THE ABLATIVE OF ATTENDANT CIRCUMSTANCES:

Nudo corpore (ABL) pugnant.
unprotected body they fight
They fight with their bodies unprotected.

c. THE ABLATIVE OF ACCOMPANIMENT:

Omnibus copiis (ABL) subsequebatur.
with all forces he followed
He followed with all his forces.

d. THE ABLATIVE OF COMPARISON:

Cato est Cicerone (ABL) eloquentior.
Cato is more eloquent than Cicero.

Cato is more eloquent than Cicero.

e. THE ABLATIVE OF MANNER:

Mirabili celeritate (ABL) venerunt.
with wonderful speed they came
They came with wonderful speed.

f. THE ABLATIVE OF MEANS:

Pugnis (ABL) certant.
with fists they fight
They fight with their fists.

Reclassify each of the above ablatives in our terminology, that is, find the thematic relations they express. Is there a way to generalize the Latin ablative using the RG feature matrix? If so, what is the generalization?
APPENDIX A: SUMMARY OF THEMATIC RELATIONS

1. CASE GRAMMAR (THEMATIC RELATIONS ARE ATOMIC CATEGORIES):

   a. **AGENTIVE**: the case of the typically animate perceived instigator of the action identified in the verb (often simply called **AGENT**).

      (1) JOHN opened the door.
      (2) The door was opened BY JOHN.
      (3) THE DEAN sent a note.
      (4) A note was sent BY THE DEAN.
      (5) There was a note FROM THE DEAN.

   b. **SOURCE**: the case which identifies the origin of the state or action identified in the verb.

      (1) John flew FROM ITALY.
      (2) John ran OUT OF THE HOUSE.

   c. **DATIVE**: the case of the usually animate entity affected by the state or action identified in the verb (often called **EXPERIENCER** or **RECIPIENT**).

      (1) John gave the book TO BILL.
      (2) BILL received the book.
      (3) The movie appeals to HIM.
      (4) THE SNOW melted.

   b. **GOAL**: the case which identifies the direction of the state or action identified in the verb.

      (1) John flew TO ITALY.
      (2) John ran INTO THE HOUSE.

2. **RG SEMANTICS:**
a. [+POSITIONAL]  [-POSITIONAL]
   He put it into the vase.  He turned it into a vase.
   He took it out of a vase.  He made it out of a vase.

b. [+]POSITIONAL] ([+]PST]): having the primary focus on location, orientation, or movement in space or time.

c. [-POSITIONAL] ([–PST]): not having the primary focus on location, orientation, or movement in space or time.

d. [+DISJUNCTURAL] ([+]DSJ): emphasizing separation, dissociation, detachment, withdrawal and the like.

e. [-DISJUNCTURAL] ([–DSJ]): not emphasizing dissociative ideas.

f. [+CONJUNCTURAL] ([+]CNJ]: emphasizing union, association, attachment, advance and the like.

g. [-CONJUNCTURAL] ([–CNJ]): not emphasizing associative ideas.

3. RG SEMANTICS (THEMATIC RELATIONS ARE BUNDLES OF FEATURES):

   a. SOURCE: [+PST, +DSJ, –CNJ]  from
   b. AGENT:  [-PST, +DSJ, –CNJ]  from, by
   d. GOAL:  [+PST, –DSJ, +CNJ]  to
   e. EXPERIENCER:  [-PST, –DSJ, +CNJ]  to
5.1 SYNTAX AND COGNITION

As we have seen, each semantic category (thematic relation) and syntactic category (part of speech) in RG is distinguished from and related to all other such categories by a system of features, so that, in fact, each category is no more than an abbreviation for a bundle of these features in the way that a sound such as [p] is an abbreviation in phonology for a bundle of phonological features like [+CONSONANTAL], [–VOCALIC], [–VOICED], etc. The figures in the preceding chapters express the interface between the categories of RG and some of the more traditional categories.

As we have seen, one of the distinguishing aspects of RG is that its syntactic feature matrix recognizes two supercategories not found in other theories of syntax. These are the category ADJUNCT ([–VBL]3 or, more simply, A3), which subsumes all of the traditional categories except verbs, and the category CHARACTERIZER ([–VBL, –NML]3 or, more simply, C3), which subsumes all of the remaining traditional categories except nouns. The breakdown is diagramed in (1) (see (97) in Chapter Three, Page 115).

(1) Syntactic Categories

- All Verb Forms
  - VBL
  - Verbal Nouns [–NML]
  - Verbs [–NML]
  - Nouns [–NML]
  - Characterizers [–NML]

[+VBL] includes VERB, AUXILIARY, MODAL, GERUND, INFINITIVE
[–VBL] includes NOUN, PRONOUN, QUANTIFIER, ADJECTIVE, ADVERB, PREPOSITION, SUBORDINATOR, COORDINATOR, COMPLEMENTIZER, DETERMINER, DEGREE WORD

[+NML] includes NOUN, PRONOUN, QUANTIFIER, GERUNDS
[–NML] includes VERB, AUXILIARY, MODAL, ADJECTIVE, ADVERB, PREPOSITION, SUBORDINATOR, COORDINATOR, COMPLEMENTIZER, DETERMINER, DEGREE WORD

Given this syntactic framework together with the phonological features described in Chapter Two and the semantic features described in Chapter Four, we have the following breakdown for the major categories of language:

(2) PHONOLOGY (see Figure Five on Page 35):
a. "CON, -"VOC] — consonants and vowels
   (1) [+CON, -VOC] — consonants ([p], [t], [k], etc.)
   (2) [-CON, +VOC] — vowels ([a], [e], [i], [o], [u], etc.)

b. "CON, "VOC] — liquids and glides
   (1) [-CON, -VOC] — glides ([w], [y], etc.)
   (2) [+CON, +VOC] — liquids ([r], [l], etc.)

(3) SEMANTICS (see Figure Nine on Page 183 and Figure Ten on Page 186):

a. "DSJ, -"CNJ] — expressions of motion and causation
   (1) [+DSJ, -CNJ] — source (extract, exit, take, buy, from, out of, etc.)
   (2) [-DSJ, +CNJ] — goal (insert, enter, give, sell, into, to, etc.)

b. "DSJ, "CNJ] — expressions of location and possession
   (1) [-DSJ, -CNJ] — location/possession (live, contain, have, own, with, etc.)
   (2) [+DSJ, +CNJ] — nonlocation/nonpossession (lack, differ, without, etc.)

(4) SYNTAX (see Figure Eight on Page 124):

a. "VBL, -"NML] — verbs and nouns
   (1) [+VBL, -NML] — verbs (destroy, predict, refuse, etc.)
   (2) [-VBL, +NML] — nouns (destruction, predication, refusal, etc.)

b. "VBL, "NML] — characterizers and gerunds
   (1) [-VBL, -NML] — adjectives (sad), adverbs (sadly), prepositions (to), etc.
   (2) [+VBL, +NML] — gerunds (swimming)

The central concept of RG syntax is the concept RESIDENCE which is a specific syntactic or morphological position that is associated with a specific semantic relation. For example, the category label DETERMINER or DET simply specifies a group of words that occupy a [+PRH, +X3L, +ENH] residence, that is, that occur in prehead position ([+PRH]) on the X3 level ([+X3L]) of a category whose head is a noun ([+ENH]). Every syntactic category (part of speech) in RG is defined in this way, as a constellation of syntactic features that refer only to positions in phrase structure.

The full range of syntactic features in RG provide a noun phrase like all those many young philosopher kings of Greece from Rome with the diagram in (5).
The phrasal architecture of diagrams like (5) is used in RG to specify the relationship between related structures: expressions of quantity (all), definiteness (those), and the like are always residents of the X3 level, that is, they are daughters of X3; all descriptive modifiers of the head, e.g., adjectives (young), restrictive relative clauses, and participial and prepositional phrases (from Rome), are residents of the X2 level; in X1 level prehead position reside the elements of compounds (philosopher in philosopher king); and, in X1 level posthead position reside all complements of the head X (Greece in king of Greece).

As a result of such specifications, RG directly incorporates into the phrasal architecture many relationships which other grammars handle transformationally. The potential difficulty of constructing a revealing set of phrase structure rules is solved with the use of the syntactic features given in Figure Eight (Page 124). All possible phrase structure sequences in English are reducible to one phrase structure filter (PSF), namely, (6).

(6) \[ X^n ( [+NML] \ ( [–NML] ) \ X^m ( [+NML] \ ( [–NML] ) \ ] \]

where m ≠ n
(6) can be interpreted as a **NODE ADMISSIBILITY CONDITION**, that is, a condition on what nodes can consist of. It asserts that each X level must dominate a lower X level with an equal or lesser prime value, e.g., X2 over X2, X1, or X but not X2 over X3. Further, (6) asserts that each X level may have at most one [+NML] and one [–NML] category, in that order, to the right and/or to the left of the head X.

The schema (6) means that syntactic categories in RG all refer to the basic phrasal structure (7).

![Diagram](7)

From each X level (m # n), both to the left and to the right of the head, can occur at most two elements. The first of these two is specified by the feature [+NML]; the second, by the feature [–NML]. In short, the feature opposition [±NUM] refers to specific linear positions in a hierarchy of positions, and nothing more. Thus, [+NML] is something that occurs in position " of (8); [–NML] is something that occurs in position $.

![Diagram](8)

The feature [+NML] is the major defining feature of the English syntactic category commonly referred to as *Noun*. All RG syntactic categories are similarly defined. To take another example, the feature opposition [±ENH] (in the environment of noun head) refers to either " or $ in (9).

![Diagram](9)

Notice that RG syntax claims that there can be at most five units on any one level. Although RG phrase structure was worked out solely on the basis of syntactic evidence, that is, autonomously, this number is, interestingly, the lower end of human short–term memory capacity. The claim in RG is that the severe restrictions on human short term memory demand that the syntax of human languages be organized into hierarchical units, and that the definitions of syntactic categories make reference to those hierarchical units. All twelve of the RG syntactic features are so defined.
In RG syntax, there are, of course, dependencies. Consider for example the diagram (10).

(10)

If \( X \) is \([+\text{NML}]\), then \$ is a characterizer, typically, a determiner. If \( X \) is \([−\text{NML}] \) and \* is \([+\text{NML}]\), then \( X \) is a transitive verb and \* is its direct object. These specifications are determined by the RG syntactic feature matrix (Figure Eight, Page 124). From such specificity, one derives the concept of residence. For example, one says that a determiner is nothing more than a class of words that resides in \( X_3 \) Level Prehead position of a \([+\text{NML}]\) category.

In recent years, there has been much research on the problem of writing a computer program which can understand natural language. Such a program is called a **PARSER**. In fact, in the summer of 1989, there was a renewed flurry of interest in developing programs for translating texts from one language into another. The Japanese, in particular, have currently invested considerable resources in the field of machine translation.

An RG computer parser is based on the concept of residence. There is, therefore, a direct connection between a theory of syntax, human syntactic ability, and the algorithms necessary to make a parser work. This connection is revealed in the number of distinct advantages there are to developing a parser based on a feature–based analysis of language, as opposed to an analysis based on atomic syntactic and semantic categories.

First, when a parser based on TG or on traditional grammar looks up a word, say, *the*, in the dictionary, it usually returns a part–of–speech specification such as \([+\text{DETERMINER}]\). Similarly, when it looks up *available*, it returns a specification such as \([+\text{ADJECTIVE}]\). Such categorial specifications provide very limited help in facilitating further parsing, particularly in determining what the immediate and upcoming structural possibilities are. The reason for this is that features like \([+\text{DETERMINER}]\) and \([+\text{ADJECTIVE}]\) have never been adequately defined in *syntactic* terms in either TG or traditional grammar; hence, computerized parsing programs have been hampered by the lack of an available syntactic feature framework on which to base parsing strategies.

On the other hand, a parser based on RG receives very useful information in a dictionary lookup. Determiners, as we have seen from Figure Eight (Page 124), are \([+\text{PRH}, −\text{PSH}, +\text{X3L}, +\text{ENH},...]\), which means that they occur only in prehead position on the \( X_3 \) Level of noun phrases; further, adjectives are generally \([+\text{PRH}, −\text{PSH}, +\text{X2L}, +\text{ENH},...]\), which means that they reside in posthead position on the \( X_2 \) Level of noun phrases. An adjective like *available* is exceptional in being marked \([+\text{PSH}]\). This information exactly specifies the syntactic structure that should be assigned.
to a sequence of words that begins, say, with the available. As a result of such precise syntactic specifications, a structural analysis of successive words in a sentence can be built and checked with great speed and accuracy by an RG parser. Therefore, the RG feature system has provided a new paradigm on which to base a parsing strategy.

A second advantage of a feature system is that so-called cross categorial relationships can be very succinctly specified. Consider, for example, the word that. Traditional and transformational grammars analyze this word as either one of the following four categories: determiner, as in That man is famous; degree word, as in He is that famous; complementizer, as in I know that he is famous; and, relative pronoun, as in The man that John saw is famous. In RG, the word that receives the feature specifications in (11).

\[
\begin{array}{cccccccccccc}
VBL & NML & OPH & OCL & PRH & PSH & ENH & EVH & ECH & X1L & X2L & X3L \\
\end{array}
\]

As (11) indicates, ten of the twelve RG features are the same for all uses of the word that. Further, the determiner and degree word have identical feature matrices, and so do the relative pronoun and complementizer. Through this system we can see how one word can come to have such “diverse” uses. Actually, the RG description of English does not include a category REL at all; its inclusion in (11) is for comparative purposes only. Similarly, the RG description of English contains no category demonstrative pronoun, common in traditional descriptions. A sentence such as Look at that is really look at that [u], where [u] means ‘understood’ thing. The feature specifications in (11) are represented diagrammatically in (12), where the N3 [much] is an abstract quantifier (before nouns the word much is overt as in that much bread and that much money; before characterizers, it is abstract as in that famous and that happily).

As (12) reveals, all instances of that reside in X3 level prehead position. A parser based on this analysis will naturally function in a highly efficient manner. When the word that is encountered in a sentence, the parser can assign it ten of the twelve possible RG features without consideration of context. Conversely, a parser based on the categories of traditional or transformational grammar is unable to assign any analysis at all to the word that without considering the context in which it is used.

\[
\begin{array}{cccccccccccc}
I & know & that & (CPL) & that & (DET) & man & that & (REL) & John & saw & seems & that & (DGR) & famous.
\end{array}
\]
A third advantage of the RG feature system is that it is completely nontransformational and allows for the direct expression of alternative constructions such as those discussed above, e.g., *available books* versus *books available*. RG syntactic constraints are stated with reference to surface structure, so that parsing is further facilitated by the complete elimination of the concept of syntactic derivation through transformation. The RG paradigm directly generates and interprets all sentences without reference to deep structures such as those found in every version of TG.

The direct application of RG to computer parsing has had a salutary effect on the problem of adequately characterizing the grammar of English. In many cases, parsing difficulties have lead to a better understanding of syntax. Constraints on language structure are directly related to parsibility, the ability of people or machines to understand language. For example, constraints on the internal
structure of English noun phrases appear to be directly related to the problem of locating the head of the noun phrase. To see this, consider again the word *that* in the following:

(13)  a. A teacher of that language is hard to find.
     b. *A that language teacher is hard to find.

(14)  a. A teacher that clever is hard to find.
     b. *A that clever teacher is hard to find.

(15)  a. How clever (of) a teacher is she?
     b. That clever (of) a teacher is hard to find.
     c. *Very clever (of) a teacher is hard to find.

These are not peculiar or disconnected data, and the explanation for the constructions is clear with an RG model. A prehead modifier in an N3 cannot have its own determiner unless it is to the left of the word *of* (we will see why this is so shortly). Since determiners and degree words share identical sets of RG features (see (11)), the source of the ungrammaticality of (13b) with DETERMINER–*that* and (14b) with DEGREE–*that* is the same. They violate this general phrase structure restriction on prehead modifiers in N3.

On the other hand, we do have (15a) and (15b), which contain adjective phrases with their own degree modifiers to the left of *of*. Actually, these adjective phrases are quantificational: *how clever* is, abstractly, *how [much] clever; that clever is that [much] clever*. The occurrence of such a phrase in such a position in other theories of English syntax is an oddity. This is not the case in an RG. The X3 level prehead residence of all categories is the home of expressions of quantification. This explains the presence of *of* in (15a) and (15b), and it rules out (15c) because *very clever* lacks a quantifier.

The same logic applied in (13) and (14) explains the loss of the complementizer in (16a) as compared to its presence in (17b):

(16) CPL obligatorily absent:

       I am [N3 [C3 an] [N1 [V3 I’d rather–do–it–myself ] [N0 person] ] ]

(17) CPL obligatorily present:

    a. *I’d rather do it myself ought to be clear.
    b. That I’d rather do it myself ought to be clear.

Given the above data, the RG analysis seems justifiable: all uses of *that* are essentially the same word.
The above generalizations are important because they link the study of syntax directly to the kinds of routines a computer parser contains, as well as to human psychology and biology. The claim of RG is that all N3 with non–quantifier heads, that is heads which are [+NML, +OCL], must have a determiner (the, those, Ø, etc.) as a PERMANENT RESIDENT (one not omissible) in X3 level prehead position. This claim can be supported independently and autonomously by examining English syntax. In turn, this claim from syntactic investigation can be related to the nature of the human language apparatus. The determiner in an English N3 acts like a cuing device with the message here comes a noun phrase. Between this cuing device and the head, there can be no other determiners; hence, we have neither (13b) nor (14b). This syntactic constraint makes it possible to write an algorithm that unambiguously finds the head of N3, a fact discovered during the writing of the first RG parser. In short, the description of the English N3 in RG has a direct relationship with computer parsing and with sentence comprehension.

It is interesting to note that the determiner of N3 parallels the wh–phrase of V3 interrogatives: (i) both are prehead X3 level adjuncts ([+VBL, +PRH, +X3L]); (ii) both are permanent residents; (iii) repetitions of both are impossible, because repetitions produce self–embedded constructions like (18) and (19); both act like cuing devices.

(18) *[N3 thati [N3 thatj [languagej ] ] teacheri ]

(19) *[v3 wherei [v3 whatj [did he put [e]j [e]i ] ] ]

The RG approach to grammar has uncovered some provocative connections between human language and human biology. As we have seen, the generality of the RG syntactic feature matrix makes possible the reduction of all phrases and clauses to variations on a single schema (3). In itself, this is a significant result. But the schema does not exist in theoretical isolation. We have seen that it allows at most five units per phrase, which is the lower end of human short term memory capacity.

From this relationship between grammatical and psychological unit, one can formulate hypotheses about the relationship between grammatical constructs and the nature of man, for example, the hypothesis that syntactic organizing principles like verb agreement derive from constraints on human memory and human perceptual abilities. Consider, for example, the case of so–called free word order languages like Classical Latin, which has the syntactic rules in (20) and the rules of concord in (21):

(20) a. The subject is in the nominative case.
    b. The direct object is in the accusative case.

(21) a. A finite verb and its subject must agree in person and number.
    b. A noun and adjective must agree in case, number, and gender.

Given (20) and (21), the sentences in (22) could, theoretically, be uttered with the individual words in any order (NS = nominative singular, NP = nominative plural, AS = accusative singular, AP = accusative plural, 3S = third person singular, 3P = third person plural).
The trusty guard is leading the old consul.

The trusty guards are leading the old consuls.
The old guards are leading the trusty consuls.
The trusty consuls are leading the old guards.
The old consuls are leading the trusty guards.

Notice that the rules of syntax (20) and concord (21) completely disambiguate (22a). However, (22b) is presumably four-ways ambiguous, because the es-ending is either nominative or accusative plural. Needless to say, one rarely comes upon sentences like (22b) in the literature, though ambiguities are found as in any language. The point here is that so-called free word order languages like Classical Latin must have some devices like (20) and (21) to hold together the integrity of the clausal unit. Latin, like all other languages, is constrained because of human neurological limitations: humans are not clairvoyant (usually), and they operate with severe constraints on short term memory. Quite naturally, languages have invented a number of devices to handle these limitations. Concord is a means of binding phrases together when word order constraints are relaxed. In such cases, all the elements of a phrase need not be under one node. Since English is relatively poor in inflectional endings, it has very severe restrictions on word order. Therefore, most constructions in English are continuous, that is, all the elements in the construction occur successively. But there are a few constructions that are discontinuous, such as the b examples in the following pairs:

(23) a. The wind blew open the barn door.
b. The wind blew the barn door open.

(24) a. John called up a former girl friend.
b. John called a former girl friend up.

Such constructions are under severe limitations of short term memory. If the direct object is too internally complex, the sentences become unacceptable:

(25) a. John called a former girl friend from Texas up.
b. ?John called a former girl friend he used to date when he lived in Texas up.
c. *John called a former girl friend he used to date when he was working as a rattle snake defanger in Texas up.
Much more is known today about the nature of the human language apparatus than was known in 1957, the year of Chomsky’s *Syntactic Structures* and Skinner’s *Verbal Behavior*. For example, a number of psychological processes can be directly connected to human linguistic abilities; in particular, man’s ability to deal with unstructured expressions is very limited. The structuring processes important in language include linear ordering, hierarchical ordering, and cuing. Thus, many studies indicate quite clearly that the justification of phrase structures must assume a very high priority in grammatical description. In the grammatical model we have described, this is exactly the case: the model attempts to draw a connection between human syntactic ability and human memory capacity.

The objective of RG research is to provide a biological basis for grammatical description. In particular, the model draws a connection between human syntactic ability and human memory capacity. Let us now examine this more carefully focusing on the description and interpretation of English noun phrases (N3) and sentences (V3).

As we have seen, all nouns and verbs in English are specified by the following features:

<table>
<thead>
<tr>
<th>CLASS FEATURES</th>
<th>EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Verbs:</td>
<td>[+VBL, –NML, +OCL]  go, eat</td>
</tr>
<tr>
<td>Auxiliary Verbs:</td>
<td>[+VBL, –NML, –OCL]  may, can</td>
</tr>
<tr>
<td>Common Nouns:</td>
<td>[–VBL, +NML, +OCL]  cake, toy</td>
</tr>
<tr>
<td>Quantifiers and Pronouns:</td>
<td>[–VBL, +NML, –OCL]  some, she</td>
</tr>
</tbody>
</table>

Notice that verbs and nouns fall into two groups distinguished by the feature opposition [+OCL] meaning ‘open class word.’ Such common verbs and nouns must have an X3 level prehead characterizer, which is called a **BINDING RESIDENT (BR)**. The BR itself is really an abbreviation for the cluster [–VBL, –NML, –OCL, –ECH, +X3L, –X2L, –X1L, +PRH]. This includes the categories COMPLEMENTIZER, DETERMINER, CASE (POSSESSIVE), and TENSE. The domain of a BR, which includes all nodes it C–commands, is called a **NEIGHBORHOOD** (see Section 3.8, Page 132 ff.). In common nouns, the BR is a determiner or POS (the possessive case); in main verbs, it is tense (PRESENT, PAST, FUTURE, CONDITIONAL, IMPERATIVE). We have representations like the following:

(27) N3:

a.  *that vote:*
b. *John’s vote* (POS = POSSESSIVE):

![Diagram of John’s vote]

In V3, complementizers are also a BR. In most indirect statements in English, a complementizer BR is optional; it is a **FREE RESIDENT**:

(29) *John thinks that Sue went.*

*John thinks Sue went.*
In indirect questions in English, a complementizer BR is obligatory; it is a **PERMANENT RESIDENT**:

(30)  
*John wonders if Sue went.*

*John wonders Sue went.*

Notice that each BR, whether a free or a permanent resident, occupies a fixed position in underlying (abstract) syntax when it does occur. If a BR, in addition, occupies a fixed position in superficial syntax, then it acts as a **BARRIER** to reference, that is, it does not allow categories on either “side” of it to refer to each other.
English contains a number of different categories called **anaphors** which refer to other phrases. For example, in *John takes care of himself*, the phrase *himself* refers to the phrase *John*. There are conditions on such reference. For example, in *John told Bill to take care of himself*, *himself* can only refer to *Bill*, not to *John*. The element [e], which we discussed in Chapter Three, is also an anaphor. As we have seen, it must be bound to a referent (see Section 3.8, Page 132 ff.). Sometimes this reference is blocked by a barrier BR. Thus, one can ask a question like *What did John say that Sue bought*, when the sentence has the free resident *that*. However, one cannot ask a question like *What did John wonder if Sue bought*, when the sentence contains the permanent resident *if*.

Those BR that are barriers include DET, POS and CPL. The position of each of these categories in both underlying and superficial syntax is fixed (when they occur). Also, each of these is a **head-only category**, that is, a category that tolerates no prehead or posthead adjuncts on any of its own internal levels. Their structure is simply [C3 C0].

The one BR that is never a barrier to reference is TNS. Its position in underlying syntax is fixed ([-ENH, +EVH, -ECH, +X3L, -X2L, -X1L, +PRH, -PSH]), but its realization in superficial syntax is variable: sometimes it appears on the modal, sometimes on the main verb, sometimes on the perfective *have*, etc. Also, TNS can have a rather complex internal structure of its own that might include modals, perfective, negatives, emphatics, etc. Apparently, for a BR to be a barrier, its position in both underlying and superficial syntax must be fixed and simple. We will explore the reason for this below.

A barrier BR establishes one of two types of **residential domains**, which we can specify explicitly by extending the C-command relation (see Section 3.8, Page 132 ff.) as follows:

\[(31)\]

a. **C–command**: a category " C–commands another category $ $ if the first branching category Z above $ $ dominates $.$.

b. **L–command**: a category " L–commands another category $ if " C–commands $ and if $ is an anaphor to the left of the head of Z.$.

c. **R–command**: a category " R–commands another category $ if " C–commands $ and if $ is an anaphor to the right of the head of Z.$.

Notice that these two new command relations simply extend the original definition and make reference to the left–to–right (linear) position of constituents. This extension is crucial to describe the restrictions on anaphoric processes in English, that is, on the rules which determine what anaphors can refer to in sentences. Given the new relations, we can make the following generalizations:

\[(32)\]

a. If a barrier is a free resident (optional), its residential domain includes all items it L–commands.
b. If a barrier is a permanent resident (obligatory), its residential domain includes all items it either L–commands or R–commands.

c. A binding relationship cannot be formed with an empty category that falls within a residential domain.

In each of the following, observe, in particular, that questioning an item commanded by the barrier BR is impossible (the b example is ungrammatical), and that the barrier BR is obligatory (the c example is ungrammatical):

(33) [Bill’s vote against gun control]; common noun head vote:

a. Mary criticized Bill’s vote against gun control.
b. *What, did Mary criticize Bill’s vote against [N3 e ]?c. *Mary criticized vote against gun control.d. Mary criticized the vote against gun control.

(34) Indirect question:

a. Mary wondered if Bill voted against gun control.
b. *What, did Mary wonder if Bill voted against [N3 e ]?c. *Mary wondered Bill voted against gun control.d. *Who, did Mary wonder if [N3 e ], voted against gun control?e. *Who, did Mary wonder [N3 e ], voted against gun control?

(35) Indirect Statement with obligatory barrier BR:

a. Mary chortled that Bill voted against gun control.
b. *What, did Mary chortle that Bill voted against [N3 e ]?c. *Mary chortled Bill voted against gun control.d. *Who, did Mary chortle that [N3 e ], voted against gun control?e. *Who, did Mary chortle [N3 e ], voted against gun control?

In contrast to (33) – (35), observe that the data fall out differently when the barrier BR is a free resident; it is only when the barrier BR is present and L–commands the empty category that ungrammaticality results:

(36) Indirect Statement with optional barrier BR:

a. Mary thought that Bill voted against gun control.
b. *What, did Mary think that Bill voted against [N3 e ]?c. Mary thought Bill voted against gun control.d. *Who, did Mary think that [N3 e ], voted against gun control?e. Who, did Mary think [N3 e ], voted against gun control?
Sometimes it appears as though there is no BR in an N3 with a common noun head, specifically, when the head is a plural count noun (votes) or a mass noun (water). However, in such cases, the null determiner Ø is present:

(37)

There are a number of reasons for positing this particular empty category. First, it allows us to distinguish between nouns that ordinarily can have determiners (all common nouns) and those that ordinarily can’t:

(38) COMMON, COUNT NOUN:

a. He wants those votes  
b. He wants Ø votes  
c. He wants a vote  
d. *He wants vote

(39) COMMON, MASS NOUN:

a. He wants that freedom.  
b. He wants Ø freedom.  
c. *He wants freedom.

(40) NONCOMMON NOUNS (PROPER NOUNS, QUANTIFIERS, PRONOUNS):

a. *He wants the John Smith.  
   (but: Will the John Smith from Troy please stand?)  
b. *He wants the some.  
c. *He wants the them.
Given the Ø–analysis, we say that an N3 with a common noun head has an obligatory BR, whereas one with a noncommon noun head does not.

A second reason for the Ø–analysis is that, with it, the following data are parallel to (33) – (36):

(41) [ Ø votes against gun control]; common noun head vote:

   a. Mary criticized Ø votes against gun control.
   b. *What, did Mary criticize Ø votes against [N3 e ]?,
   c. *Mary criticized votes against gun control.
   d. Mary criticized that vote against gun control.

Third, if we adopt an analysis with Ø, we can generalize the insertion of of in all the following:

(42) a. A number of the systems are complicated.
 b. A number of those systems are complicated.
 c. A number of Ø systems are complicated.

Given this description, we can now explore what the function of a barrier BR is. In both V3 and N3, the barrier BR, as the obligatory element, signals the beginning of the phrase. Therefore, we might suppose that, for parsing purposes, it acts like a cuing device. We see this most clearly in subject complements where the complementizer can never be left out:

(43) a. That Bill voted against gun control is odd.
 b. * Bill voted against gun control is odd.
 c. *What, that Bill voted against [N3 e ], is odd.

Leaving out the complementizer in (43b) results in a miscue: it appears as though the clause Bill voted against gun control is the main clause of the sentence.

In N3, the major parsing problem is locating the head. Consider the following observing the number on the verb:

(44) a. The school shows play here. (Subject is shows; the verb play is plural.)
 b. The school show plays here. (Subject is show; the verb plays is singular.)
 c. The school shows plays here. (Subject is school; the verb shows is singular.)
 d. The schools show plays here. (Subject is schools; the verb show is plural.)

As these examples attest, finding the head of an N3 is not always straightforward, particularly when a compound noun interpretation like school show(s) or student teacher(s) is possible. But the language does provide a number of constraints that facilitate the correct location of the head.

First, the only noun in a compound noun phrase that can have its own BR is the head:
(45) a. a teacher of Sanskrit
    a Sanskrit teacher
b. a teacher of that language
    *a that language teacher
    a language teacher
c. Ø teachers of that language
    *Ø that language teachers
    Ø language teachers
d. a teacher that clever (is hard to find)
    *a that clever teacher (is hard to find)
    a clever teacher (is hard to find)

Second, the only noun in a compound noun phrase that can be plural is the head:

(46) a. a teacher of Ø languages
    *a Ø languages teacher
    a language teacher
b. a wall of four feet
    *a four feet wall
    a four foot wall
    *a wall of four foot

Third, any item occurring to the left of the BR must be separated from the BR by the word of:

(47) a. A number of the systems are complicated.
    The student letters are here.
    The student of letters is here.
b. A number of Ø systems are complicated.
c. *the number Ø systems ...
    (here number systems is a compound noun)
    His love stories are charming.
    His love of stories is charming.

Fourth, if no overt marker is present separating a head noun from its complement, e.g., against in a vote against gun control, then of must be inserted to signal the right boundary of the head:

(48) a. The student letters are here.
    The student of letters is here.
b. His love stories are charming.
    His love of stories is charming.

Thus, if the head noun is a singular count noun, we know what the left boundary of the head is, because in such cases the BR is overt (cf. (38c)). If the head is a plural count noun, the BR need not be overt, that is, Ø is possible (cf. (38b)). But, in such a case, we know that the plural noun must be the head because only the head can be plural in a compound noun sequence.

Summarizing, we have the following N3 constraints:
The N3 Constraints:

a. All N3 with a common noun head must have a BR as a permanent resident. This BR is either a determiner or the possessive case.

b. Items to the left of the BR are separated from the BR by of.

c. Items to the right of the head are separated from the head by of if no overt characterizer is present.

d. Any noun occurring between the BR and the head cannot have any of its own X3 Level elements:
   (1) Such nouns show no number or case distinctions of their own.
   (2) Such nouns have no determiners of their own.

This conspiracy of restrictions works very well. There are some minor exceptions. The quantifier all does not have to be followed by of:

They counted all (of) the votes.

There are a few sporadic N3 where a plural (usually irregular) is not the head:

a. I met the women delegates.

b. *I met the ladies delegates.

c. I met the lady delegates.

Despite these minor glitches, the N3 Constraint is well established for English. We may now ask why a language should have such a constraint. Since the N3 constraint was discovered during the search for an algorithm for locating the head of an N3, it has always seemed natural to conclude that the reason for the constraint is just that, namely, to help locate the head of an N3. This conclusion concurs with the RG hypothesis that syntax and memory are linked. Let us now investigate this connection.

No matter how large and internally complex an N3 becomes, we have seen that there are never more than five units on any level; that N3 always precede C3 on each level, both to the left of the head and to the right of the head; that of separates quantifiers and determiners; that of separates the head from following posthead modifiers. Thus, the essential structure of every N3 is (52) with area X specifying the bounds of the N3 Constraints.

```
N3               
+))))0))))))))))))))))3))))
...of........DET.........N0.......of...
 .))))0)))))
 
8 8 X 8 8
anchor  cue  head  anchor
```
The area marked “X” in (52) is the area in which three of the noun phrase constraints operate. Within X, there can be only one determiner and only singular nouns. Since any violation of these constraints makes it impossible to locate the head unambiguously, the suggestion is that the constraints are not arbitrary; rather, they exist to help speakers locate the head of a noun phrase.

Notice that, with the constraints, ambiguity disappears. First, the word of acts like anchor points delineating the boundaries of the head. Second, if the head is singular, the noun phrase must be cued by an overt determiner; we don’t have sentences like *he is carrying book. Third, if the head is plural, the determiner need not be overt (he is carrying books), but in such cases one knows that the plural noun must be the head, because the only allowable plural between the DET and the head is the head. In short, the constraints appear to result from cognitive limitations. Humans are not clairvoyant and need structural principles to locate the heads of phrases in languages like English. The N3 Constraints are such principles.

Given this analysis, we have an explanation for why the past tense has become regular in English for all persons and number, but the present tense has not. Compare (53) and (54).

(53) Regular Past Tense; played for all persons and number: He/They played.

(54) Irregular Present Tense: He plays versus They play.

The basic problem is that singular and plural noun inflection is identical to verb inflection:

(55) a. play: either a singular noun or a plural present
    b. plays: either a plural noun or a singular present

There are many nouns in English that also function as verbs. On the other hand, there are only a few past tense verbs that are also nouns, and they are all irregular, e.g., cut and hit. Further, locating the head of an English noun phrase is not a trivial matter. There are many opportunities for ambiguity. All these potential ambiguities are eliminated by the rule of subject verb agreement. Quite simply, without the inflectional differences between singular and plural count nouns and between singular and plural present verbs, speakers would be unable to locate the head of a noun phrase. Thus, the present tense of verbs cannot become regular.

We have already noted in a number of places that there is substantial psycholinguistic evidence supporting the analysis of language into chunks of constituent structure. As we have seen, RG syntax reduces all phrases and clauses to variations on one structural schema (6) repeated here for convenience:

(56) \[ X^n ([+NML]) ([–NML]) X^m ([+NML]) ([–NML]) \] where m ≠ n

(56) is, of course, a realization of (6). Thus, the structure of even gargantuan N3 (see Chapter Three, Page 122) reduces to five chunks of constituents, the lower end of human short term memory capacity.
We also suggested above that the BR acts like a cuing device signaling the obligatory left boundary (beginning) of an N3. There has been considerable psycholinguistic interest in the role of cuing. In particular, studies focusing on the word *that* (what we are calling a BR) indicate that sentence comprehension is facilitated when the BR is overt.

There are two broad categories that can serve as a BR in English syntax: the determiners (DET and CPL) and the inflections (POS and TNS). Of these, only TNS lacks a fixed position in both underlying and superficial syntax, as we have seen. And, of these, only TNS does not serve as a barrier. If, in fact, the BR is a cuing device, this seems appropriate. It is hardly likely that something that serves as a cue to upcoming structures would itself have an unreliable realization.

To this, we may add various studies on *anchors*: experimental results indicate that subjects have better access to structure at the beginning (front anchoring) and end (end anchoring) of strings of elements. One might view the two occurrences of *of* in (52) as anchor points defining the obligatory bounds of an N3. It is well-known that front-anchoring is very important in linear ordering and that hierarchical structure is very important in the processing of long lists. These findings are in direct accord with the model of phrase structure proposed in this book and provide a link between syntactic description and the so-called special human faculty of language.

5.2 OVERVIEW OF ANAPHORA

Given the above description of English syntax, let us now turn to a more in-depth analysis of reference to see how our model can account for grammatical relationships in a revealing way. English has the following types of anaphors (items which refer to phrases in a sentence):

(57) a. Personal Pronouns (*he, him, his; she, her, hers; they, them, their, theirs*, etc.)
   b. Reflexive Pronouns (*himself, herself, themselves*, etc.)
   c. Reciprocal Pronouns (*each other*, etc.)
   d. Floating Quantifiers (*all, both, each*, etc.)
   e. The Empty Category [*e*].

The basic problem is to provide a description of English which will account for the items that anaphors can and cannot refer to. For example, consider the following:

(58) a. Ann said that Sue hurt *her*. (*her = Ann not Sue*).
   b. Ann said that Sue hurt *herself*. (*herself = Sue not Ann*).

We need a description of English which will account the way native speakers understand the above sentences. Specifically, native speakers know that the personal pronoun *her* in *Ann said that Sue hurt her* cannot refer to *Sue*, whereas *herself* in *Ann said that Sue hurt herself* must refer to *Sue*. The use of pronouns like *her* and *herself* is very common in everyday speech, and native speakers have no trouble determining what they can and cannot refer to. Since the number of possible sentences
in English and every other language is infinite, this means that speakers must know some principles for determining the possible referents for anaphors. Our objective is to specify those principles.

Among the anaphors listed above is the empty category \([e]\) which always has a sentence internal referent. For example, a sentence like *This book, the city must burn* is represented as follows (see (146) on Page 133):

![Diagram](image)

The \([e]\) in the above diagram refers to the phrase *this book*, a sentence internal element. This empty category must be distinguished from the empty category \([u]\) (=understood) which is not an anaphor because it has no sentence internal referent. For example, a sentence like *Let’s eat* means *Let us eat something*. We represent the meaning as “Let us eat \([u]\)” where the referent for “[u]” is understood and not interpreted in relation to some other noun phrase in the sentence in the way [e] is.

As we have seen throughout this book, syntactic principles are based on phrase structure. In regard to anaphors, we will make use of the following structural relationships described in Chapter Three:
(60)  a. C–command: a category $C$–commands another category $\$, if the first branching category $Z$ above $\$ dominates $\$.
    b. Neighborhood: includes all items C–commanded by the same TNS characterizer.

To see how these relationships work, consider the following diagram which will serve as the basis for our entire discussion of anaphors:

(61)

In (61), the following relationships obtain:

(62)  a. $N_{3w}$ C–commands $N_{3x}$, $N_{3y}$, and $N_{3z}$.
    b. $N_{3x}$ does not C–command $N_{3w}$, but does C–command both $N_{3y}$ and $N_{3z}$.
    c. $N_{3y}$ does not C–command $N_{3w}$ or $N_{3x}$, but does C–command and $N_{3z}$.
    d. $N_{3z}$ does not C–command either $N_{3w}$ or $N_{3x}$ or $N_{3y}$.

(63)  a. $N_{3w}$ and $N_{3x}$ are in the same neighborhood.
    b. $N_{3y}$ and $N_{3z}$ are in the same neighborhood.
    c. $N_{3w}$ and $N_{3y}$ are not in the same neighborhood.
    d. $N_{3w}$ and $N_{3z}$ are not in the same neighborhood.
    e. $N_{3x}$ and $N_{3y}$ are not in the same neighborhood.
    f. $N_{3x}$ and $N_{3z}$ are not in the same neighborhood.
As a start, we recognize the following principles:

(64) **PRINCIPLE 1: EVERY ANAPHOR MUST AGREE WITH ITS REFERENT IN PERSON, NUMBER AND GENDER.**

a. Bob likes himself. \( (\text{himself} \) agrees with Bob) 
b. *Bob likes myself. \( (\text{no agreement in person}) 

(65) **PRINCIPLE 2: A PERSONAL PRONOUN CANNOT BE IN THE SAME NEIGHBORHOOD AS ITS REFERENT.**

a. \[ V_3 \text{ Bob told him many lies } \] \( (\text{him} \neq \text{Bob}) 

b. \[ V_3 \text{ Bob told Sue } V_3 \text{ that Ann likes him } \] \( (\text{him} = \text{Bob}) 

(66) **PRINCIPLE 3: A REFLEXIVE PRONOUN MUST BE IN THE SAME NEIGHBORHOOD AS ITS REFERENT.**

a. \[ V_3 \text{ Bob told himself many lies } \] \( (\text{himself} = \text{Bob}) 

b. *\[ V_3 \text{ Bob told Sue } V_3 \text{ that Ann likes himself } \] \( (\text{himself} \neq \text{Bob}) 

(67) **PRINCIPLE 4: A RECIPROCAL PRONOUN MUST BE IN THE SAME NEIGHBORHOOD AS ITS REFERENT.**

a. \[ V_3 \text{ People tell each other lies } \] \( (\text{each other} = \text{people}) 

b. *\[ V_3 \text{ People have told me } V_3 \text{ that Sue told each other lies } \] 

(68) **PRINCIPLE 5: A FLOATING QUANTIFIER MUST BE IN THE SAME NEIGHBORHOOD AS ITS REFERENT.**

a. \[ V_3 \text{ Both Bob and Ted told lies } \] \( (\text{both} = \text{Bob and Ted}) 

b. \[ V_3 \text{ Bob and Ted both told lies } \] \( (\text{both} = \text{Bob and Ted}) 

c. \[ V_3 \text{ the two men said } V_3 \text{ that the two women both told lies } \] \( (\text{both} = \text{the two women not the two men}) 

Some examples which illustrate the above principles are as follows (the subscripted N3 refer to the basic diagram in (61):
Given the above basic principles, let us now look at the anaphors individually. Beginning with personal pronouns, we propose the following:

(70) **PRINCIPLE 6:** A PERSONAL PRONOUN CAN REFER TO ANY N3 OUTSIDE ITS OWN NEIGHBORHOOD UNLESS IT BOTH PRECEDES AND C–COMMANDS THAT N3.
We see this principle illustrated in the following examples:

(71) a. He told Sue that Ted liked Ann. (he ≠ Ted)

\[ N_3^w \text{ PST } \text{tell } N_3^x \text{ that } N_3^y \text{ PST } \text{like } N_3^z \]
\[ \text{he } \text{told } \text{Sue } \text{that } \text{Ted } \text{liked } \text{Ann} \]

\( N_3^w \) precedes and C–commands \( N_3^y \); therefore, a personal pronoun in \( N_3^w \) slot cannot refer to a noun in \( N_3^y \) slot.

b. Bob told Sue that he liked Ann. (he = Bob)

\[ N_3^w \text{ PST } \text{tell } N_3^x \text{ that } N_3^y \text{ PST } \text{like } N_3^z \]
\[ \text{Bob } \text{told } \text{Sue } \text{that } \text{he } \text{liked } \text{Ann} \]

\( N_3^y \) neither precedes nor C–commands \( N_3^w \); the two phrases are in different neighborhoods; therefore, a personal pronoun in \( N_3^y \) slot can refer to a noun in \( N_3^w \) slot.

c. Bob told Sue that Ted liked her. (her = Sue)

\[ N_3^w \text{ PST } \text{tell } N_3^x \text{ that } N_3^y \text{ PST } \text{like } N_3^z \]
\[ \text{Bob } \text{told } \text{Sue } \text{that } \text{Ted } \text{liked } \text{her} \]

\( N_3^z \) neither precedes nor C–commands \( N_3^w \); the two phrases are in different neighborhoods; therefore, a personal pronoun in \( N_3^z \) slot can refer to a noun in \( N_3^w \) slot.

d. Bob told her that Ted liked Sue. (her ≠ Sue)

\[ N_3^w \text{ PST } \text{tell } N_3^x \text{ that } N_3^y \text{ PST } \text{like } N_3^z \]
\[ \text{Bob } \text{told } \text{her } \text{that } \text{Ted } \text{liked } \text{Sue} \]

\( N_3^x \) precedes and C–commands \( N_3^z \); therefore, a personal pronoun in \( N_3^x \) slot cannot refer to a noun in \( N_3^z \) slot.

e. Bob told Ann that Sue liked her. (her = Ann; her ≠ Sue)

\[ N_3^w \text{ PST } \text{tell } N_3^x \text{ that } N_3^y \text{ PST } \text{like } N_3^z \]
\[ \text{Bob } \text{told } \text{Ann } \text{that } \text{Sue } \text{liked } \text{her} \]
N₃ₓ neither precedes nor C–commands N₃ₓ, and the two phrases are in different neighborhoods, so a personal pronoun in the N₃ₓ slot can refer to a noun in the N₃ₓ slot, and her can refer to Ann. But, since Sue and her are in the same neighborhood, her cannot refer to Sue even though they agree in person, number, and gender.

Turning to reflexive and reciprocal pronouns, we have the following principle and illustrative examples:

(72) **PRINCIPLE 7: A REFLEXIVE OR RECIPROCAL PRONOUN MUST BE R–COMMANDED BY ITS REFERENT IN ITS OWN NEIGHBORHOOD.**

R–command: a category " R–commands another category $ if the first branching category Z above " dominates $ and if $ is an anaphor to the right of the head of Z.

a. Bob told himself that Sue liked him. (himself = Bob)

Bob told himself that Sue liked him

The first branching category above N₃ₓ is the top V3. The top V3 dominates N₃ₓ. The head of the top V3 is the V0 tell. N₃ₓ is to the right of tell. Thus, N₃ₓ R–commands N₃ₓ; further, both phrases are in the same neighborhood, so himself can refer to Bob. Since N₃ₓ neither precedes nor C–commands N₃ₓ, and both phrases are in different neighborhoods, a personal pronoun in the N₃ₓ slot can refer to a noun in the N₃ₓ slot.

b. *Bob told Ann that Sue liked himself. (himself ≠ Bob)

Bob told Ann that Sue liked himself

N₃ₓ R–commands N₃ₓ but the two phrases are not in the same neighborhood; therefore, a reflexive pronoun in N₃ₓ slot cannot refer to a noun in N₃ₓ slot.

c. Bob told Ann that Sue liked herself. (herself = Sue; herself ≠ Ann)

Bob told Ann that Sue liked herself
N3_y R–commands N3_z and both phrases are in the same neighborhood; therefore, a reflexive pronoun in N3_z slot can refer to a noun in N3_y slot, and herself can refer to Sue. But, even though N3_x R–commands N3_z, herself cannot refer to Ann because the two phrases are in different neighborhoods.

d. *Herself told Ann that Sue liked Kay.
   *Kay told Ann that herself liked Sue.

\[
\begin{align*}
    \text{N3}_w & \quad \text{PST} \quad \text{tell} \quad \text{N3}_x \quad \text{that} \quad \text{N3}_y & \quad \text{PST} \quad \text{like} \quad \text{N3}_z \\
    \text{*herself} & \quad \text{told} \quad \text{Ann} \quad \text{that} \quad \text{Sue} & \quad \text{liked} \quad \text{Kay} \\
    \text{*Kay} & \quad \text{told} \quad \text{Ann} \quad \text{that} \quad \text{herself} & \quad \text{liked} \quad \text{Sue}
\end{align*}
\]

Neither sentence is possible because the reflexives do not have any R–commanding referent in their own neighborhoods.

e. The two men told Sue that the two women liked each other.

\[
\begin{align*}
    \text{N3}_w & \quad \text{PST} \quad \text{tell} \quad \text{N3}_x \quad \text{that} \quad \text{N3}_y & \quad \text{PST} \quad \text{like} \quad \text{N3}_z \\
    \text{the two men} & \quad \text{told} \quad \text{Sue} \quad \text{that} \quad \text{the two women} & \quad \text{liked} \quad \text{each other}
\end{align*}
\]

The phrase each other must refer to the two women because it is in the same neighborhood as the two women.

f. *The two men told Sue that Ann liked each other.

\[
\begin{align*}
    \text{N3}_w & \quad \text{PST} \quad \text{tell} \quad \text{N3}_x \quad \text{that} \quad \text{N3}_y & \quad \text{PST} \quad \text{like} \quad \text{N3}_z \\
    \text{the two men} & \quad \text{told} \quad \text{Sue} \quad \text{that} \quad \text{Ann} & \quad \text{liked} \quad \text{each other}
\end{align*}
\]

The phrase each other has no possible referent in its own neighborhood so the sentence is ungrammatical.

Turning to floating quantifiers, consider the following principle and illustrative diagram:

(73) **PRINCIPLE 8: A FLOATING QUANTIFIER MUST BE L–COMMANDED BY ITS REFERENT IN ITS OWN NEIGHBORHOOD.**

L–command: a category " L–commands another category $ if the first branching category Z above " dominates $ and if $ is an anaphor to the left of the head of Z.
The behavior of floating quantifiers is illustrated in the following examples:

(75)  

a. The men will all tell the women to buy it.

N₃ₚₜ will FUT N₃ₓ tell N₃ᵧ to buy N₃₉
the men will all tell the women to buy it

The first branching category above N₃ₚₜ is the top V₃. The top V₃ dominates N₃ₓ. The head of the top V₃ is the V₀ *tell*. N₃ₓ is to the left of *tell*. Thus, N₃ₚₜ L–commands N₃ₓ, so all can refer to the *men*.

b. The men will tell all the women to buy it.

N₃ₚₜ will FUT N₃ₓ tell N₃ᵧ to buy N₃₉
the men will tell all the women to buy it

The first branching category above N₃ₚₜ is the top V₃, and the head of the top V₃ is the V₀ *tell*. Since all occurs to the right of *tell*, it cannot refer back to the men. All is inside the N₃ᵧ, so all quantifiers women. We know that all is inside N₃ᵧ because it cannot be separated from the rest of the elements within N₃ᵧ:

[1] All the women were told to buy it.
[2] *The women were told all to buy it.
To the principles above, we add the following two principles for formally determining the subject and object of a verb:

(76) **PRINCIPLE 9: SUBJECTS MUST C–COMMAND AND PRECEDE THEIR VERBS AND NOUNS.**

(77) **PRINCIPLE 10: OBJECTS MUST C–COMMAND AND FOLLOW THEIR VERBS AND NOUNS.**

These principles are illustrated in the following diagram and examples:

(78)

![Diagram]

a. The girls will all want to dress themselves. (no N3ₜ)
The girls will all want to dress each other. (no N3ₜ)

N₃ₜ will FUT N₃ₓ want N₃ᵧ to dress N₃₉
the girls will all want to dress themselves

The first branching category above N₃ₜ is the top V₃.

The top V₃ dominates N₃ₓ. The head of the top V₃ is the V₀ want. N₃ₓ is to the left of want. Thus, N₃ₜ L–commands N₃ₓ, so all can refer to the girls.

The top V₃ dominates N₃₉. The head of the top V₃ is the V₀ want. N₃₉ is to the right of want. Thus, N₃ₜ R–commands N₃₉, so themselves can refer to the girls.
Also: N₃ₓ is the subject of both *want* and *dress* since it C–commands and precedes both verbs; N₃ᵧ is the object of *dress* since it C–commands and follows *dress*.

The verb *want* has no object because there is no N3 which C–commands and follows it. Because there is no object, there is nothing between *want* and *to*, so they contract to *wanna*.

b. The girls will all want the boys to dress themselves.
The girls will all want the boys to dress each other.

N₃ₓ will FUT N₃ₓ want N₃ᵧ to dress N₃ᵦ
the girls will all want the boys to dress themselves

N₃ₓ is the subject of *want* since it C–commands and precedes *want*; N₃ᵧ is the subject of *dress* since it C–commands and precedes *dress*. N₃ᵧ is the object of *want* since it C–commands and follows *want*; N₃ᵦ is the object of *dress* since it C–commands and follows *dress*. As above, the referent for *all* is *the girls*; however, the referent for *themselves is the boys*: the first branching category above N₃ᵧ is the V₂, V₂ dominates N₃ᵦ, and N₃ᵦ contains an anaphor to the right of the head of V₂.

Lastly, we consider the following principle for the interpretation of [e], the empty anaphor:

(79) PRINCIPLE 11: [e] CAN BE ANYWHERE EXCEPT IN A RESIDENTIAL DOMAIN. THUS, [e] CANNOT BE C–COMMANDED BY A PERMANENT RESIDENT OR L–COMMANDED BY A FREE RESIDENT.

a. Binding residents and barriers.

[1] Binding resident (BR) – the C3 dominated by the lowest recursion of X3 (DET or POS in N3; TNS or CPL in V3).
[2] Barrier BR – a C3 whose position is constant (DET, POS, CPL) – acts as a cuing device to structure.

b. Residents and residential domains.

[1] Permanent residents – those that are obligatory (e.g. *whether* in *I wonder whether he went*). The domain of a permanent resident is all items it C–commands.
[2] Free residents – those that are optional (e.g. *that* in *He said (that) she knew me*). The domain of a free resident is all items it L–commands.

c. Empty category condition (ECC): An empty anaphor [X₃ e] within some immediate neighborhood must be bound to a V3 Level phrase of the same type in the extended neighborhood.
d. Wh–binding condition (WHBC): all phrases in the extended neighborhood must be bound to an [e]. Usually, but not always, such phrases contain a WH–word, e.g., who, which, at what time, etc.

Principle 11 is illustrated in the following examples discussed previously:

(80) [Bill’s vote against gun control]; common noun head vote:

a. Mary criticized Bill’s vote against gun control.
b. *What did Mary criticize Bill’s vote against [N3 e ]?
c. *Mary criticized vote against gun control.
d. Mary criticized the vote against gun control.

(81) Indirect question:

a. Mary wondered if Bill voted against gun control.
b. *What did Mary wonder if Bill voted against [N3 e ]?
c. *Mary wondered Bill voted against gun control.
d. *Who did Mary wonder if [N3 e ] voted against gun control?
e. *Who did Mary wonder [N3 e ] voted against gun control?

(82) Indirect Statement with obligatory barrier BR:

a. Mary chortled that Bill voted against gun control.
b. *What did Mary chortle that Bill voted against [N3 e ]?
c. *Mary chortled Bill voted against gun control.
d. *Who did Mary chortle [N3 e ] voted against gun control?
e. *Who did Mary chortle [N3 e ] voted against gun control?

(83) Indirect Statement with optional barrier BR:

a. Mary thought that Bill voted against gun control.
b. What did Mary think that Bill voted against [N3 e ]?
c. Mary thought Bill voted against gun control.
d. *Who did Mary think that [N3 e ] voted against gun control?
e. Who did Mary think [N3 e ] voted against gun control?
EXERCISES FOR CHAPTER FIVE

1. Account for the reference of all of the anaphors in the following examples:
   
   a. The little girls want to dress themselves.
   b. The little girls say that they dressed each other.
   c. The little girls [e] that [e] dressed themselves are cute.
   d. The little girls have all dressed alike.
   e. The little girls all want to dress each other.

2. Determine the subjects of each use of *swim* in the following:
   
   a. John wants to swim in the ocean.
   b. John wants you to swim in the ocean.
   c. It is forbidden to swim in the ocean.
   d. It is forbidden for you to swim in the ocean.
   e. You are forbidden to swim in the ocean.

3. Explain the ungrammaticality of the following:
   
   a. *What did John put the coats in the closet?*
   b. *Which books does John think is good?*
   c. *John wants her to drive himself to the party.*
   d. *Each other like(s) the women.*
   e. *The women who is next to himself like John.*

4. What principle(s) account for the following sets of data?
   
   a. That John hit something is clear.
      *What is that John hit [e] clear?*
      What is it clear that John hit [e]?
   
   b. John denied the claim that his car hit the tree.
      *What did John deny the claim that his car hit [e]?*
      What did John deny that his car hit [e]?
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APPENDIX I: SAMPLE PARSES FROM THE LANGTECH PARSER

SENTENCES FROM CHAPTER THREE, EXERCISE 7

(1) the book may be in the library

The clause "the book may be in the library" is a statement.
The phrase "in the library" is a prepositional phrase and a modifier of the verb "be".
The phrase "the book" is a noun phrase and the subject of the verb "be".
The phrase "the library" is a noun phrase and the object of the preposition "in".
The word "be" is the main verb of "the book may be in the library".
The word "book" is a singular count noun.
The word "book" is the head of the noun phrase "the book".
The word "in" is a preposition introducing the prepositional phrase "in the library".
The word "library" is a singular count noun.
The word "library" is the head of the noun phrase "the library".
The word "may" is a modal auxiliary specifying the meaning of the verb "be".
The word "the" is a determiner specifying the noun "library".
The word "the" is a determiner specifying the noun "book".

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  |         |                   |         |         |
  |         |                   |         |         |
  C3        N0                  C0        V0        C3
  |        NOUN1      |---------|        MVERB      |
  |        book       |         |         be        |
  |                   |         |                   |
  C0                  V3        C0                  C1
  DET3                 |         TNS                 |-------------------|
  the                  |         PRS                 |                   |
  |                   |         |                   |
  V0                            C0                  N3
  MODAL                          PRP       |---------|
  may                           in        |         |
  |         |
  C3                  N0
  |        NOUN1 |
  |        library |
  |                   |
  C0                  DET3
  the
```
(2) john will not read those magazines

The clause "john will not read those magazines" is a statement.
The phrase "john" is a noun phrase and the subject of the verb "read".
The phrase "those magazines" is a noun phrase and the direct object of the verb "read".
The word "john" is a proper noun.
The word "magazines" is a plural count noun.
The word "those" is the head of the noun phrase "those magazines".
The word "not" is a negative specifying the modal "will".
The word "read" is the main verb of "john will not read those magazines".
The word "those" is a determiner specifying the noun "magazines".
The word "will" is a modal auxiliary specifying the meaning of the verb "read".
The clause "mary will send a letter to the company" is a statement.
The phrase "a letter to the company" is a noun phrase and the direct object of the verb "send".
The phrase "the company" is a noun phrase and the object of the preposition "to".
The phrase "to the company" is a prepositional phrase and a complement of the verb "send".
The word "a" is a singular count noun.
The word "letter" is a singular count noun.
The word "company" is the head of the noun phrase "the company".
The word "sent" is the main verb of "mary will send a letter to the company".
The word "the" is a singular count noun.
The word "to" is a preposition introducing the prepositional phrase "to the company".
The word "will" is a modal auxiliary specifying the meaning of the verb "send".

The clause "mary will send a letter to the company" is a statement.
The phrase "a letter" is a noun phrase and the direct object of the verb "send".
The phrase "the company" is a noun phrase and the object of the preposition "to".
The phrase "to the company" is a prepositional phrase and a complement of the verb "send".
The word "a" is a singular count noun.
The word "letter" is a singular count noun.
The word "company" is the head of the noun phrase "the company".
The word "sent" is the main verb of "mary will send a letter to the company".
The word "the" is a singular count noun.
The word "to" is a preposition introducing the prepositional phrase "to the company".
The word "will" is a modal auxiliary specifying the meaning of the verb "send".

The clause "mary will send a letter to the company" is a statement.
The phrase "a letter to the company" is a noun phrase and the direct object of the verb "send".
The phrase "the company" is a noun phrase and the object of the preposition "to".
The phrase "to the company" is a prepositional phrase and a complement of the verb "send".
The word "a" is a singular count noun.
The word "letter" is a singular count noun.
The word "company" is the head of the noun phrase "the company".
The word "sent" is the main verb of "mary will send a letter to the company".
The word "the" is a singular count noun.
The word "to" is a preposition introducing the prepositional phrase "to the company".
The word "will" is a modal auxiliary specifying the meaning of the verb "send".

The clause "mary will send a letter to the company" is a statement.
The phrase "a letter to the company" is a noun phrase and the direct object of the verb "send".
The phrase "the company" is a noun phrase and the object of the preposition "to".
The phrase "to the company" is a prepositional phrase and a complement of the verb "send".
The word "a" is a singular count noun.
The word "letter" is a singular count noun.
The word "company" is the head of the noun phrase "the company".
The word "sent" is the main verb of "mary will send a letter to the company".
The word "the" is a singular count noun.
The word "to" is a preposition introducing the prepositional phrase "to the company".
The word "will" is a modal auxiliary specifying the meaning of the verb "send".

The clause "mary will send a letter to the company" is a statement.
The phrase "a letter to the company" is a noun phrase and the direct object of the verb "send".
The phrase "the company" is a noun phrase and the object of the preposition "to".
The phrase "to the company" is a prepositional phrase and a complement of the verb "send".
The word "a" is a singular count noun.
The word "letter" is a singular count noun.
The word "company" is the head of the noun phrase "the company".
The word "sent" is the main verb of "mary will send a letter to the company".
The word "the" is a singular count noun.
The word "to" is a preposition introducing the prepositional phrase "to the company".
The word "will" is a modal auxiliary specifying the meaning of the verb "send".

The clause "mary will send a letter to the company" is a statement.
The phrase "a letter to the company" is a noun phrase and the direct object of the verb "send".
The phrase "the company" is a noun phrase and the object of the preposition "to".
The phrase "to the company" is a prepositional phrase and a complement of the verb "send".
The word "a" is a singular count noun.
The word "letter" is a singular count noun.
The word "company" is the head of the noun phrase "the company".
The word "sent" is the main verb of "mary will send a letter to the company".
The word "the" is a singular count noun.
The word "to" is a preposition introducing the prepositional phrase "to the company".
The word "will" is a modal auxiliary specifying the meaning of the verb "send".

The clause "mary will send a letter to the company" is a statement.
The phrase "a letter to the company" is a noun phrase and the direct object of the verb "send".
The phrase "the company" is a noun phrase and the object of the preposition "to".
The phrase "to the company" is a prepositional phrase and a complement of the verb "send".
The word "a" is a singular count noun.
The word "letter" is a singular count noun.
The word "company" is the head of the noun phrase "the company".
The word "sent" is the main verb of "mary will send a letter to the company".
The word "the" is a singular count noun.
The word "to" is a preposition introducing the prepositional phrase "to the company".
The word "will" is a modal auxiliary specifying the meaning of the verb "send".
(4) john reads those magazines

The clause "john reads those magazines" is a statement.
The phrase "john" is a noun phrase and the subject of the verb "reads".
The phrase "those magazines" is a noun phrase and the direct object of the verb "reads".
The word "john" is a proper noun.
The word "magazines" is a plural count noun.
The word "those" is the head of the noun phrase "those magazines".
The word "reads" is a third person singular present tense verb.
The word "those" is a determiner specifying the noun "magazines".

(5) the roses border the fence

The clause "the roses border the fence" is a statement.
The phrase "the fence" is a noun phrase and the direct object of the verb "border".
The phrase "the roses" is a noun phrase and the subject of the verb "border".
The word "border" is a present tense verb.
The word "border" is the main verb of "the roses border the fence".
The word "fence" is a singular count noun.
The word "fence" is the head of the noun phrase "the fence".
The word "roses" is a plural count noun.
The word "roses" is the head of the noun phrase "the roses".
The word "the" is a determiner specifying the noun "roses".
The word "the" is a determiner specifying the noun "fence".
(6) the accident occurred at the corner

The clause "the accident occurred at the corner" is a statement. The phrase "at the corner" is a prepositional phrase and a modifier of the verb "occurred". The phrase "the accident" is a noun phrase and the subject of the verb "occurred". The phrase "the corner" is a noun phrase and the object of the preposition "at". The word "accident" is a singular count noun. The word "accident" is the head of the noun phrase "the accident". The word "corner" is a singular count noun. The word "corner" is the head of the noun phrase "the corner". The word "occurred" is a past tense verb. The word "occurred" is the main verb of "the accident occurred at the corner". The word "the" is a determiner specifying the noun "corner". The word "the" is a determiner specifying the noun "accident".

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(7) the plant fell out the window

The clause "the plant fell out the window" is a statement. The phrase "out the window" is a prepositional phrase and a modifier of the verb "fell". The phrase "the plant" is a noun phrase and the subject of the verb "fell". The phrase "the window" is a noun phrase and the object of the preposition "out". The word "fell" is a past tense verb. The word "fell" is the main verb of "the plant fell out the window". The word "out" is a preposition introducing the prepositional phrase "out the window". The word "plant" is a singular count noun. The word "plant" is the head of the noun phrase "the plant". The word "the" is a determiner specifying the noun "plant". The word "the" is a determiner specifying the noun "window". The word "window" is a singular count noun. The word "window" is the head of the noun phrase "the window".

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(8) the boy could take the garbage out

The clause "the boy could take the garbage out" is a statement.
The phrase "the boy" is a noun phrase and the subject of the verb "take".
The phrase "the garbage" is a noun phrase and the direct object of the verb "take".
The word "boy" is a singular count noun.
The word "boy" is the head of the noun phrase "the boy".
The word "could" is a modal auxiliary specifying the meaning of the verb "take".
The word "garbage" is a singular mass noun.
The word "garbage" is the head of the noun phrase "the garbage".
The word "out" is a particle (intransitive preposition) and a complement of the verb "take".
The word "take" is the main verb of "the boy could take the garbage out".
The word "the" is a determiner specifying the noun "garbage".
The word "the" is a determiner specifying the noun "boy".

(9) the boy could take out the garbage

The clause "the boy could take out the garbage" is a statement.
The phrase "the boy" is a noun phrase and the subject of the verb "take".
The phrase "the garbage" is a noun phrase and the direct object of the verb "take".
The word "boy" is a singular count noun.
The word "boy" is the head of the noun phrase "the boy".
The word "could" is a modal auxiliary specifying the meaning of the verb "take".
The word "garbage" is a singular mass noun.
The word "garbage" is the head of the noun phrase "the garbage".
The word "out" is a particle (intransitive preposition) forming a phrasal verb with the verb "take".
The word "take" is the main verb of "the boy could take out the garbage".
The word "the" is a determiner specifying the noun "garbage".
The word "the" is a determiner specifying the noun "boy".
(10) the book was not in the library

The clause "the book was not in the library" is a statement. The phrase "in the library" is a prepositional phrase and a modifier of the verb "was". The phrase "the book" is a noun phrase and the subject of the verb "was". The phrase "the library" is a noun phrase and the object of the preposition "in". The word "book" is a singular count noun. The word "book" is the head of the noun phrase "the book". The word "in" is a preposition introducing the prepositional phrase "in the library". The word "library" is a singular count noun. The word "library" is the head of the noun phrase "the library". The word "not" is a negative specifying the verb "was". The word "the" is a determiner specifying the noun "book". The word "was" is a past tense verb. The word "was" is the main verb in auxiliary position of "the book was not in the library". The word "[e]" is the abstract empty main verb of "the book was not in the library".
SAMPLE PARSES ILLUSTRATING VERB PATTERNS

(11) INTRANSITIVE: the senator resigned

The clause "the senator resigned" is a statement.
The phrase "the senator" is a noun phrase and the subject of the verb "resigned".
The word "resigned" is a past tense verb.
The word "resigned" is the main verb of "the senator resigned".
The word "senator" is a singular count noun.
The word "senator" is the head of the noun phrase "the senator".
The word "the" is a determiner specifying the noun "senator".

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V3
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C3    N0    C0
| NOUN1  TNS
|   senator  PST
C0
DET3
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(12) TRANSITIVE (DIRECT OBJECT COMPLEMENT ON V1): the senator admired the president

The clause "the senator admired the president" is a statement.
The phrase "the president" is a noun phrase and the direct object of the verb "admired".
The phrase "the senator" is a noun phrase and the subject of the verb "admired".
The word "admired" is a past tense verb.
The word "admired" is the main verb of "the senator admired the president".
The word "president" is a singular count noun.
The word "president" is the head of the noun phrase "the president".
The word "senator" is a singular count noun.
The word "senator" is the head of the noun phrase "the senator".
The word "the" is a determiner specifying the noun "president".
The word "the" is a determiner specifying the noun "senator".

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C3    N0    C0    V0
| NOUN1  TNS
|   senator  PST
V3
|       |
C0    C3    N0
| VERB3
C0
DET3
the
(13) COPULATIVE (PREDICATE COMPLEMENT ON V2): the senator became the president

The clause "the senator became the president" is a statement.
The phrase "the president" is a noun phrase describing the subject "senator".
The phrase "the senator" is a noun phrase and the subject of the verb "became".
The word "became" is a past tense verb.
The word "became" is the main verb of "the senator became the president".
The word "president" is a singular count noun.
The word "senator" is the head of the noun phrase "the senator".
The word "the" is a determiner specifying the noun "senator".
The word "the" is a determiner specifying the noun "president".

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(14) COPULATIVE (PREDICATE COMPLEMENT ON V2): the senator turned red

The clause "the senator turned red" is a statement.
The phrase "red" is an adjective phrase describing the subject "senator".
The phrase "the senator" is a noun phrase and the subject of the verb "turned".
The word "red" is an adjective.
The word "senator" is a singular count noun.
The word "the" is the head of the noun phrase "the senator".
The word "the" is a determiner specifying the noun "senator".
The word "turned" is a past tense verb.
The word "turned" is the main verb of "the senator turned red".

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The word "the" is a determiner specifying the noun "president".
(15) INTRANSITIVE WITH A MANNER ADVERB: the senator resigned angrily

The clause "the senator resigned angrily" is a statement.
The phrase "angrily" is an adverb phrase modifying the verb "resigned".
The phrase "the senator" is a noun phrase and the subject of the verb "resigned".
The word "angrily" is a manner adverb.
The word "resigned" is a past tense verb.
The word "resigned" is the main verb of "the senator resigned angrily".
The word "senator" is a singular count noun.
The word "senator" is the head of the noun phrase "the senator".
The word "the" is a determiner specifying the noun "senator".

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C3  N0  C0  V0  C3
| NOUN1  TNS  VERB3 |
| senator  PST  resigned |
|             |
C0  C0
DET3  ADV1
the  angrily

(16) INTRANSITIVE WITH PREDICATE ADJECTIVE: the senator resigned angry

The clause "the senator resigned angry" is a statement.
The phrase "angry" is a predicate adjective referring back to the subject "senator".
The phrase "the senator" is a noun phrase and the subject of the verb "resigned".
The word "angry" is an adjective.
The word "resigned" is a past tense verb.
The word "resigned" is the main verb of "the senator resigned angry".
The word "senator" is a singular count noun.
The word "senator" is the head of the noun phrase "the senator".
The word "the" is a determiner specifying the noun "senator".

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C3  N0  C0  V0  C3
| NOUN1  TNS  VERB3 |
| senator  PST  resigned |
|             |
C0  C0
DET3  ADV1
the  angry
(17) TRANSITIVE (DIRECT OBJECT + MANNER ADVERB):  fred left the country quickly

The clause "fred left the country quickly" is a statement.
The phrase "fred" is a noun phrase and the subject of the verb "left".
The phrase "quickly" is an adverb phrase modifying the verb "left".
The phrase "the country" is a noun phrase and the direct object of the verb "left".
The word "country" is a singular count noun.
The word "country" is the head of the noun phrase "the country".
The word "the" is the main verb of "fred left the country quickly".
The word "quickly" is a manner adverb.
The word "the" is a determiner specifying the noun "country".

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(18) TRANSITIVE (DIRECT OBJECT + MANNER ADVERB):  fred left the country happily

The clause "fred left the country happily" is a statement.
The phrase "fred" is a noun phrase and the subject of the verb "left".
The phrase "happily" is an adverb phrase modifying the verb "left".
The phrase "the country" is a noun phrase and the direct object of the verb "left".
The word "country" is a singular count noun.
The word "country" is the head of the noun phrase "the country".
The word "the" is the main verb of "fred left the country happily".
The word "happily" is a manner adverb.
The word "the" is a determiner specifying the noun "country".

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(19) fred left the country happy

a. TRANSITIVE (DIRECT OBJECT + OBJECTIVE COMPLEMENT):

The clause "fred left the country happy" is a statement.
The phrase "fred" is a noun phrase and the subject of the verb "left".
The phrase "happy" is an adjective phrase describing "country".
The phrase "the country" is a noun phrase and the direct object of the verb "left".
The word "country" is the head of the noun phrase "the country".
The word "country" is a singular count noun.
The word "fred" is a proper noun.
The word "happy" is an adjective.
The word "left" is a past tense verb.
The word "the" is a determiner specifying the noun "country".

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(20) TRANSITIVE (DIRECT OBJECT + INDIRECT OBJECT): she gave them to us

The clause "she gave them to us" is a statement.
The phrase "she" is a noun phrase and the subject of the verb "gave".
The phrase "them" is a noun phrase and the direct object of the verb "gave".
The phrase "to us" is a prepositional phrase and the indirect object of the verb "gave".
The word "us" is a noun phrase and the object of the preposition "to".
The word "gave" is a past tense verb.
The word "them" is the main verb of "she gave them to us".
The word "us" is a third person singular feminine subject pronoun.
The word "them" is a third person plural object pronoun.
The word "to" is a preposition introducing the prepositional phrase "to us".
The word "us" is a first person plural object pronoun.

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N0
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(21) TRANSITIVE (DIRECT OBJECT + PREPOSITIONAL PHRASE): she put them near us

The clause "she put them near us" is a statement.
The phrase "near us" is a prepositional phrase and a complement of the verb "put".
The phrase "she" is a noun phrase and the subject of the verb "put".
The phrase "them" is a noun phrase and the direct object of the verb "put".
The phrase "us" is a noun phrase and the object of the preposition "near".
The word "near" is a preposition introducing the prepositional phrase "near us".
The word "put" is a past tense verb.
The word "put" is the main verb of "she put them near us".
The word "she" is a third person singular feminine subject pronoun.
The word "them" is a third person plural object pronoun.
The word "us" is a first person plural object pronoun.

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(22) TRANSITIVE (DOUBLE OBJECT):  she gave us them

The clause "she gave us them" is a statement.
The phrase "she" is a noun phrase and the subject of the verb "gave".
The phrase "them" is a noun phrase and the direct object of the verb "gave".
The phrase "us" is a noun phrase and the indirect object of the verb "gave".
The word "gave" is a past tense verb.
The word "gave" is the main verb of "she gave us them".
The word "she" is a third person singular feminine subject pronoun.
The word "them" is a third person plural object pronoun.
The word "us" is a first person plural object pronoun.

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(23) TRANSITIVE (DOUBLE OBJECT):  they elected a democrat the president

The clause "they elected a democrat the president" is a statement.
The phrase "a democrat" is a noun phrase and the direct object of the verb "elected".
The phrase "the president" is a noun phrase and the object complement of the verb "elected".
The phrase "they" is a noun phrase and the subject of the verb "elected".
The word "a" is a determiner specifying the noun "democrat".
The word "democrat" is a singular count noun.
The word "democrat" is the head of the noun phrase "a democrat".
The word "elected" is a past tense verb.
The word "elect" is the main verb of "they elected a democrat the president".
The word "president" is a singular count noun.
The word "president" is the head of the noun phrase "the president".
The word "the" is a determiner specifying the noun "president".
The word "they" is a third person plural subject pronoun.

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(24) TRANSITIVE (SENTENTIAL COMPLEMENT; INDIRECT STATEMENT): i know that she went

The clause "i know that she went" is a statement.
The clause "she went" is an indirect statement.
The clause "that she went" is a complement clause of the verb "know".
The phrase "i" is a noun phrase and the subject of the verb "know".
The phrase "she" is a noun phrase and the subject of the verb "went".
The word "i" is a first person singular subject pronoun.
The word "know" is a present tense verb.
The word "she" is a third person singular feminine subject pronoun.
The word "that" is a complementizer specifying the complement clause "she went".
The word "went" is a past tense verb.
The word "went" is the main verb of "that she went".

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N3    C3    V1
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|       |       |                                       |
N0    C0    V0    V3
NOM1A  TNS  VERB1     |-----------------------------|
i  PRS  know
C3       V3
|       |-------|-------|
|       |       |       |
C0    N3    C3    V0
CPL     |       |       VERB3
that    |       |       went
N0    C0
NOM1C  TNS
she    PST

(25) TRANSITIVE (SENTENTIAL COMPLEMENT; INDIRECT STATEMENT): i know she went

The clause "i know she went" is a statement.
The clause "she went" is an indirect statement.
The phrase "i" is a noun phrase and the subject of the verb "know".
The phrase "she" is a complement clause of the verb "know".
The word "i" is a first person singular subject pronoun.
The word "know" is a present tense verb.
The word "she" is the main verb of "i know she went".
The word "she" is a third person singular feminine subject pronoun.
The word "went" is a past tense verb.
The word "went" is the main verb of "she went".

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N3    C3    V1
|       |       |---------------------------------------|
|       |       |                                       |
N0    C0    V0    V3
NOM1A  TNS  VERB1     |-----------------------------|
i  PRS  know
C3       V3
|       |-------|-------|
|       |       |       |
C0    N3    C3    V0
EMPCPL1A  VERB3
Ø       |       |       went
N0    C0
NOM1C  TNS
she    PST
(26) TRANSITIVE (SENTENTIAL COMPLEMENT; INDIRECT STATEMENT): i know that man is mortal

The clause "i know that man is mortal" is a statement.
The clause "man is mortal" is an indirect statement.
The clause "that man is mortal" is a complement clause of the verb "know".
The phrase "i" is a noun phrase and the subject of the verb "know".
The phrase "man" is a noun phrase and the subject of the verb "is".
The phrase "mortal" is a predicate adjective referring back to the subject "man".
The word "is" is a third person singular present tense verb.
The word "is" is the main verb of "man is mortal".
The word "man" is a personal pronoun.
The word "mortal" is an adjective.
The word "Ø" is an abstract empty determiner specifying the noun "man".
The word "that" is a complementizer specifying the complement clause "man is mortal".

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N3       C3       V1
|         | ------------------------------------------|
|         |         |         |         |         |
N0       C0       V0       V3
NOM1A     TNS       VERB1
i         PRS       know
|         |---------|---------|
|         |         |         |
C3                                      V3
|         |---------|---------|
|         |         |         |
C0       N3       C3       V2
CPL
that
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</table>
C3       N0       C0       V0       C3
|         | NOUN3B   TNS       VERB2 |
|         | man       PRS       is   |
C0                                      C0
DET1B   ADJ1
Ø       mortal
The clause "i know whether she went" is a statement.
The clause "whether she went" is an indirect question.
The phrase "i" is a noun phrase and the subject of the verb "know".
The phrase "she" is a noun phrase and the subject of the verb "went".
The word "whether" is an interrogative pronoun.
The word "know" is the main verb of "i know whether she went".
The word "she" is a third person singular feminine subject pronoun.
The word "went" is a past tense verb.
The word "whether" is the main verb of "whether she went".
The word "where" is an interrogative pronoun.
(29) TRANSITIVE (SENTENTIAL COMPLEMENT; INDIRECT QUESTION): i know who went

The clause "i know who went" is a statement.
The clause "who went" is an indirect question.
The phrase "i" is a noun phrase and the subject of the verb "know".
The phrase "[e]" is the referent of "who" and the empty subject noun phrase of the verb "went".
The word "i" is a first person singular subject pronoun.
The word "know" is a present tense verb.
The word "went" is a past tense verb.
The word "went" is the main verb of "i know who went".
The word "who" is an interrogative pronoun.

V3

[---------|---------|]
|         |         |
N3        C3        V1
|         |         |---------------------------------------|
|         |         |                                       |
|         |         |                                       |
N0        C0        V0                                      V3
NOMIA     TNS       VERB1
i       PRS       know
N3i                           V3
|         |---------|---------|
|         |         |         |
N0        N3i       C3        V0
ROG1   |         |        VERB3
who   |         |        went
N0        C0
NEMPE     TNS
[e]      PST

(30) TRANSITIVE (SENTENTIAL COMPLEMENT; INDIRECT QUESTION): i know who he admires

The clause "i know who he admires" is a statement.
The clause "who he admires" is an indirect question.
The phrase "i" is a noun phrase and the subject of the verb "know".
The phrase "[e]" is an abstract empty noun phrase and the direct object of the verb "admiries".
The word "admiries" is a third person singular present tense verb.
The word "admiries" is the main verb of "who he admires".
The word "he" is a third person singular masculine subject pronoun.
The word "i" is a first person singular subject pronoun.
The word "know" is a present tense verb.
The word "know" is the main verb of "i know who he admires".
The word "who" is an interrogative pronoun.

V3

[---------|---------|]
|         |         |
N3        C3        V1
|         |         |---------------------------------------|
|         |         |                                       |
|         |         |                                       |
N0        C0        V0                                      V3
NOMIA     TNS       VERB1
i       PRS       know
N3i                           V3
|         |---------|---------|
|         |         |         |
N0        N3i       C3        V0
ROG2   |         |        VERB2
who   |         |        admires
N0        C0        V0        N3i
NOM1C     TNS       VERB2
he        PRS       admires
N0
NEMPE     TNS
[e]
(31) TRANSITIVE (DIRECT OBJECT + SENTENTIAL COMPLEMENT; INDIRECT STATEMENT): he told me that she went

The clause "he told me that she went" is a statement.
The clause "that she went" is a complement clause of the verb "told".
The clause "she went" is an indirect statement.
The phrase "he" is a noun phrase and the subject of the verb "told".
The phrase "me" is a noun phrase and the direct object of the verb "told".
The phrase "she" is a noun phrase and the subject of the verb "went".
The word "he" is a third person singular masculine subject pronoun.
The word "me" is a first person singular object pronoun.
The word "she" is a third person singular feminine subject pronoun.
The word "that" is a complementizer specifying the complement clause "she went".
The word "told" is a past tense verb.
The word "went" is a past tense verb.
The word "went" is the main verb of "that she went".

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N3      C3  V1
|        |        |-----------------------------|
|        |        |                             |
N0      C0  V0  N3  V3
NOMIC   TNS  VERB3  |-----------------------------|
he      PST  told  |
|        |        |
N0      C3  V3
ACC     |        |-----------------------------|
me      |        |                             |
N0      C0  N3  C3  V0
CPL     |        | VERB3
that    |        | went
N0      C0
NOMIC   TNS
she     PST

(32) TRANSITIVE (DIRECT OBJECT + SENTENTIAL COMPLEMENT; INDIRECT STATEMENT): he told me she went

The clause "he told me she went" is a statement.
The clause "that she went" is a complement clause of the verb "told".
The clause "she went" is an indirect statement.
The phrase "he" is a noun phrase and the subject of the verb "told".
The phrase "me" is a noun phrase and the direct object of the verb "told".
The phrase "she" is a noun phrase and the subject of the verb "went".
The word "he" is a third person singular masculine subject pronoun.
The word "me" is a first person singular object pronoun.
The word "Ø" is a complementizer specifying the complement clause "she went".
The word "she" is a third person singular feminine subject pronoun.
The word "told" is a past tense verb.
The word "told" is the main verb of "he told me she went".
The word "went" is a past tense verb.
The word "went" is the main verb of "that she went".

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N3      C3  V1
|        |        |-----------------------------|
|        |        |                             |
N0      C0  V0  N3  V3
NOMIC   TNS  VERB3  |-----------------------------|
he      PST  told  |
|        |        |
N0      C3  V3
ACC     |        |-----------------------------|
me      |        |                             |
C0      N3  C3  V0
EMPCPLIA |        | VERB3
Ø        |        | went
N0      C0
NOMIC   TNS
she     PST
The clause "he told me whether she went" is a statement.

The clause "whether she went" is a complement clause of the verb "told".

The phrase "whether she went" is an indirect question.

The phrase "she" is a noun phrase and the subject of the verb "went".

The phrase "whether she went" is a noun phrase and the subject of the verb "went".

The word "he" is a third person singular masculine subject pronoun.

The word "me" is a first person singular object pronoun.

The word "she" is a third person singular feminine subject pronoun.

The word "told" is a past tense verb.

The word "went" is the main verb of "he told me whether she went".

The word "whether" is an interrogative pronoun.
(35) TRANSITIVE (DIRECT OBJECT + SENTENTIAL COMPLEMENT; INDIRECT QUESTION):  she told me who [e] went

The clause "she told me who went" is a statement.
The clause "who went" is an indirect question.
The phrase "me" is a noun phrase and the direct object of the verb "told".
The phrase "she" is a noun phrase and the subject of the verb "told".
The phrase "[e]" is the referent of "who" and the empty subject noun phrase of the verb "went".
The word "me" is a first person singular object pronoun.
The word "she" is a third person singular feminine subject pronoun.
The word "told" is a past tense verb.
The word "she" is the main verb of "she told me who went".
The word "went" is a past tense verb.
The word "went" is the main verb of "who went".
The word "who" is an interrogative pronoun.

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N3        C3        V1
|         |         |---------|---------------------------------------|
|         |         |         |                                       |
N0        C0        V0        N3                                      V3
NOM1C     TNS       VERB3      |         |-----------------------------|
she PST told |
|         |         |---------|---------|
|         |         |         |         |
ACC       |         |---------|---------|
me        |
N0        N3,       C3        V0
ROG1       |         |         |---------|
who |         |         |         |
N0        C0
NEMPE     TNS
[e]        PST

(36) TRANSITIVE (DIRECT OBJECT + SENTENTIAL COMPLEMENT; INDIRECT QUESTION):  she told me who he admires

The clause "she told me who he admires" is a statement.
The clause "who he admires" is an indirect question.
The phrase "me" is a noun phrase and the direct object of the verb "told".
The phrase "she" is a noun phrase and the subject of the verb "told".
The phrase "[e]" is an abstract empty noun phrase and the direct object of the verb "admires".
The word "admires" is a third person singular present tense verb.
The word "admires" is the main verb of "who he admires".
The word "he" is a third person singular masculine subject pronoun.
The word "me" is a first person singular subject pronoun.
The word "she" is a third person singular feminine subject pronoun.
The word "told" is a past tense verb.
The word "told" is the main verb of "she told me who he admires".
The word "who" is an interrogative pronoun.

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N3        C3        V1
|         |         |---------|---------------------------------------|
|         |         |         |                                       |
N0        C0        V0        N3                                      V3
NOM1C     TNS       VERB3      |         |-----------------------------|
she PST told |
|         |         |---------|---------|
|         |         |         |         |
ACC       |         |---------|---------|
me        |
N0        N3,       C3        V1
ROG2       |         |         |---------|
who |         |         |         |
N0        C0        V0        N3,1
NOM1C     TNS       VERB2      |
he PRS admires |
N0
The clause "he relies on her advice" is a statement.
The phrase "he" is a noun phrase and the subject of the verb "relies".
The phrase "her advice" is a noun phrase and the object of the preposition "on".
The phrase "her" is a possessive phrase specifying "advice".
The phrase "on her advice" is a prepositional phrase and a complement of the verb "relies".
The word "advice" is a singular mass noun.
The word "advice" is the head of the noun phrase "her advice".
The word "he" is a third person singular masculine subject pronoun.
The word "her" is a third person singular feminine possessive pronoun.
The word "on" is a preposition introducing the prepositional phrase "on her advice".
The word "POS" is a determiner specifying the noun "advice".
The word "relies" is a third person singular present tense verb.
The word "advice" is the main verb of "he relies on her advice".

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The clause "he went on her advice" is a statement.
The phrase "he" is a noun phrase and the subject of the verb "went".
The phrase "her advice" is a noun phrase and the object of the preposition "on".
The phrase "her" is a possessive phrase specifying "advice".
The phrase "on her advice" is a prepositional phrase and a modifier of the verb "went".
The word "advice" is a singular mass noun.
The word "advice" is the head of the noun phrase "her advice".
The word "he" is a third person singular masculine subject pronoun.
The word "her" is a third person singular feminine possessive pronoun.
The word "on" is a preposition introducing the prepositional phrase "on her advice".
The word "POS" is a determiner specifying the noun "advice".
The word "went" is a past tense verb.
The word "went" is the main verb of "he went on her advice".

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The clause "she sat on the hat" is a statement.
The phrase "on the hat" is a prepositional phrase and a complement of the verb "sat".
The phrase "she" is a noun phrase and the subject of the verb "sat".
The phrase "the hat" is a noun phrase and the object of the preposition "on".
The word "hat" is a singular count noun.
The word "on" is the head of the prepositional phrase "on the hat".
The word "sat" is the main verb of "she sat on the hat".
The word "sat" is a past tense verb.
The word "she" is a third person singular feminine subject pronoun.
The word "the" is a determiner specifying the noun "hat".

The clause "she put on the hat" is a statement.
The phrase "she" is a noun phrase and the subject of the verb "put".
The phrase "the hat" is a noun phrase and the direct object of the verb "put".
The word "hat" is a singular count noun.
The word "on" is the head of the noun phrase "the hat".
The word "put" is a particle (intransitive preposition).
The word "put" is the main verb of "she put on the hat".
The word "put" is a past tense verb.
The word "she" is a third person singular feminine subject pronoun.
The word "the" is a determiner specifying the noun "hat".
(41) TRANSITIVE (DIRECT OBJECT + PARTICLE): she put the hat on

The clause "she put the hat on" is a statement.
The phrase "she" is a noun phrase and the subject of the verb "put".
The phrase "the hat" is a noun phrase and the direct object of the verb "put".
The word "hat" is a singular count noun.
The word "hat" is the head of the noun phrase "the hat".
The word "on" is a particle (intransitive preposition).
The word "put" is a past tense verb.
The word "put" is the main verb of "she put the hat on".
The word "she" is a third person singular feminine subject pronoun.
The word "the" is a determiner specifying the noun "hat".

V3
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|-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right
(43) TRANSITIVE (COMPLEMENTARY INFINITIVE): she asked to go

The clause "she asked to go" is a statement.
The phrase "she" is a noun phrase and the subject of the verb "asked".
The phrase "to go" is an infinitive complement of the verb "asked".
The word "asked" is a past tense verb.
The word "asked" is the main verb of "she asked to go".
The word "go" is an infinitive verb.
The word "she" is a third person singular feminine subject pronoun.
The word "to" is the infinitive marker introducing the infinitive phrase "to go".

V3
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N3        C3        V1
|         |         |---------|
|         |         |         |
N0        C0        V0        C3
NOMIC      TNS      VERB3      |
she      PST      asked      |
|         |---------|         |---------|
|         |         |         |---------|
|         |         |         |         |
N0        C0        V0        N3        C3
NOMIC      TNS      VERB3      |         |
she      PST      asked      |
|         |---------|         |---------|
|         |         |         |---------|
|         |         |         |         |
N0        C0        V0        C3
ACC      |---------|
him      |
|---------|
C0        V3
|         |
INF      |
to      |
|---------|
V0
VBARE
go

(44) TRANSITIVE (DIRECT OBJECT + COMPLEMENTARY INFINITIVE): she asked him to go

The clause "she asked him to go" is a statement.
The phrase "him" is a noun phrase and subject of the infinitive verb "go".
The phrase "she" is a noun phrase and the direct object of the verb "asked".
The phrase "to go" is an infinitive complement of the verb "asked".
The word "asked" is a past tense verb.
The word "asked" is the main verb of "she asked him to go".
The word "go" is an infinitive verb.
The word "him" is a third person singular masculine object pronoun.
The word "she" is a third person singular feminine subject pronoun.
The word "to" is the infinitive marker introducing the infinitive phrase "to go".

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N3        C3        V1
|         |         |---------|
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N0        C0        V0        C3
NOMIC      TNS      VERB3      |
she      PST      asked      |
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N0        C0        V0        N3        C3
NOMIC      TNS      VERB3      |
she      PST      asked      |
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N0        C1
ACC      |---------|
him      |
|---------|
C0        V3
INF      |
to      |
|---------|
V0
VBARE
go
(45) TRANSITIVE (PREPOSITIONAL OBJECT WITH INFINITIVE): she prayed for him to win

The clause "she prayed for him to win" is a statement.
The phrase "for him to win" is a prepositional phrase and a complement of the verb "prayed".
The phrase "him" is a noun phrase and the subject of the verb "win".
The phrase "him" is a noun phrase and the object of the preposition "for".
The phrase "she" is a noun phrase and the subject of the verb "prayed".
The word "for" is a preposition introducing the prepositional phrase "for him to win".
The word "him" is a third person singular masculine object pronoun.
The word "prayed" is a past tense verb.
The word "prayed" is the main verb of "she prayed for him to win".
The word "she" is a third person singular feminine subject pronoun.
The word "to" is the infinitive marker introducing the infinitive phrase "to win".
The word "win" is an infinitive verb.

```
V3
|--------|--------|
N3    C3    V1
|                   |--------|
|                   |         |
N0    C0    V0    C3
NOMIC  TNS  VERB3 |
        she    PST    prayed |
        C1
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C0    N3    C3
PRP    for |
|         |
N0    C1
ACC    him |
|         |
C0    V3
INF    to |
|         |
V0
VBARE
win
```

(46) TRANSITIVE (PREPOSITIONAL OBJECT WITH INFINITIVE): she relied on him to finish

The clause "she relied on him to finish" is a statement.
The phrase "him" is a noun phrase and the object of the preposition "on".
The phrase "him" is a noun phrase and the subject of the verb "finish".
The phrase "on him to finish" is a prepositional phrase and a complement of the verb "relied".
The phrase "she" is a noun phrase and the subject of the verb "asked".
The word "finish" is an infinitive verb.
The word "him" is a third person singular masculine object pronoun.
The word "on" is a preposition introducing the prepositional phrase "on him to finish".
The word "relied" is a past tense verb.
The word "relied" is the main verb of "she relied on him to finish".
The word "she" is a third person singular feminine subject pronoun.
The word "to" is the infinitive marker introducing the infinitive phrase "to finish".

```
V3
|--------|--------|
N3    C3    V1
|                   |--------|
|                   |         |
N0    C0    V0    C3
NOMIC  TNS  VERB3 |
        she    PST    relied |
        C1
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C0    N3    C3
PRP    for |
|         |
N0    C1
ACC    him |
|         |
C0    V3
INF    to |
|         |
V0
VBARE
win
```
(47) TRANSITIVE (DIRECT OBJECT + BARE INFINITIVE VERB): i saw him cheer

The clause "i saw him cheer" is a statement.
The phrase "cheer" is the bare infinitive complement of the verb "saw".
The phrase "him" is a noun phrase and the direct object of the verb "saw".
The phrase "i" is a noun phrase and the subject of the verb "saw".
The word "cheer" is a bare infinitive verb.
The word "him" is a third person singular masculine object pronoun.
The word "i" is a first person singular subject pronoun.
The word "saw" is a past tense verb.
The word "saw" is the main verb of "i saw him cheer".

(48) TRANSITIVE (DIRECT OBJECT + PASSIVE PARTICIPLE): i saw him cheered

The clause "i saw him cheered" is a statement.
The phrase "cheered" is a passive participle phrase describing "him".
The phrase "him" is a noun phrase and the direct object of the verb "saw".
The phrase "i" is a noun phrase and the subject of the verb "saw".
The phrase "[e]" is an empty noun phrase and the direct object of the verb "cheered".
The word "cheered" is a passive participle.
The word "him" is a third person singular masculine object pronoun.
The word "i" is a first person singular subject pronoun.
The word "saw" is a past tense verb.
The word "saw" is the main verb of "i saw him cheered".
The word "[-ed]" is the abstract marker for the passive participle.
(49) TRANSITIVE (DIRECT OBJECT + PROGRESSIVE PARTICIPLE): i saw him cheering

The clause "i saw him cheering" is a statement.
The phrase "cheering" is a progressive participle phrase describing "him".
The phrase "him" is a noun phrase and the direct object of the verb "saw".
The phrase "i" is a noun phrase and the subject of the verb "saw".
The word "cheering" is a progressive participle.
The word "him" is a third person singular masculine object pronoun.
The word "i" is a first person singular subject pronoun.
The word "saw" is a past tense verb.
The word "saw" is the main verb of "i saw him cheering".
The word "[-ing]" is the abstract marker for the progressive participle.

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|         |         |         |         |
N0        C0        V0        N3        C3
|         |         |         |         |
NOM1A     TNS        VERB3        |         |
i        PST        saw        |         |
|         |         |         |         |
|         |         |         |         |
|         |         |         |         |
ACC       N0        C0        |---------|         |
him      |         |         |         |
|         |         |         |         |
|         |         |         |         |
C0        V3        PGP        |         |
[-[-ing]]|         |         |
|         |         |
|         |         |
V0
VERB3
cheering

The clause "i saw him cheering" is a statement.
The phrase "cheering" is a progressive participle phrase describing "i".
The phrase "him" is a noun phrase and the direct object of the verb "saw".
The phrase "i" is a noun phrase and the subject of the verb "saw".
The word "cheering" is a progressive participle.
The word "him" is a third person singular masculine object pronoun.
The word "i" is a first person singular subject pronoun.
The word "saw" is a past tense verb.
The word "saw" is the main verb of "i saw him cheering".
The word "[-ing]" is the abstract marker for the progressive participle.

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N0        C0        V1        C3
|         |         |         |         |
NOM1A     TNS        |---------|         |
i        PST        |         |
|         |         |         |         |
|         |         |         |         |
|         |         |         |         |
N0        C0        V3
|         |         |         |         |
VERB3        |         |---------|---------|
saw        |         |         |         |
|         |         |         |         |
|         |         |         |         |
|         |         |         |         |
N0        C0        V3
|         |         |         |         |
VERB3
cheering
(50) AMBIGUITY: i heard the tenor singing

The clause "i heard the tenor singing" is a statement.
The phrase "i" is a noun phrase and the subject of the verb "heard".
The phrase "the tenor singing" is a noun phrase and the direct object of the verb "heard".
The word "heard" is a past tense verb.
The word "tenor" is a noun forming a compound noun with "singing".
The word "the tenor" is a singular count noun.
The word "tenor" is the head of the noun phrase "the tenor singing".
The word "the" is a determiner specifying the noun "singing".

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N3  C3  V1
|       |       |
N0  C0  V0  N3
NOM1A  TNS  VERB3
i  PST  heard
   |       |
   C3  N1
   |       |
   C0  N3  N0
   DET3  NOUN1
the | singing
   |       |
   N0
NOUN1
   tenor

The clause "i heard the tenor singing" is a statement.
The phrase "i" is a noun phrase and the subject of the verb "heard".
The phrase "singing" is a progressive participle phrase describing "tenor".
The phrase "the tenor singing" is a noun phrase and the direct object of the verb "heard".
The word "heard" is a past tense verb.
The word "tenor" is a first person singular subject pronoun.
The word "singing" is a progressive participle.
The word "the tenor" is a singular count noun.
The word "the tenor" is the head of the noun phrase "the tenor singing".
The word "the" is a determiner specifying the noun "tenor".
The word "[-ing]" is the abstract marker for the progressive participle.
The clause "I heard the tenor singing" is a statement.
The phrase "I" is a noun phrase and the subject of the verb "heard".
The phrase "singing" is a progressive participle phrase describing "tenor".
The phrase "the tenor" is a noun phrase and the direct object of the verb "heard".
The word "heard" is a past tense verb.
The word "heard" is the main verb of "I heard the tenor singing".
The word "I" is a first person singular subject pronoun.
The word "singing" is a progressive participle.
The word "tenor" is a singular count noun.
The word "tenor" is the head of the noun phrase "the tenor".
The word "the" is a determiner specifying the noun "tenor".
The word "[-ing]" is the abstract marker for the progressive participle.

V3

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NOM1A TNS VERB3 |---------| |
1 PST heard |
| C3 N0 C0 |
| NOUN1 |---------|
| tenor | | |
C0 C0 V3
DET3 PGP |
the [-ing] |
V0 VERB5 singing
(51) the school shows play here

The clause "the school shows play here" is a statement.
The phrase "the school shows" is a noun phrase and the subject of the verb "play".
The word "play" is a present tense verb.
The word "school" is a singular count noun.
The word "the school" is the head of the noun phrase "school".
The word "shows" is a plural count noun.
The word "shows" is the head of the noun phrase "the school shows".
The word "the" is a determiner specifying the noun "shows".
The word "here" is a locative quantifier modifying the verb "play".

(52) the school show plays here

The clause "the school show plays here" is a statement.
The phrase "the school show" is a noun phrase and the subject of the verb "plays".
The word "plays" is a third person singular present tense verb.
The word "show" is the main verb of "the school show plays here".
The word "school" is a singular count noun.
The word "school" is the head of the noun phrase "school".
The word "show" is a singular count noun.
The word "show" is the head of the noun phrase "the school show".
The word "the" is a determiner specifying the noun "show".
The word "here" is a locative quantifier modifying the verb "shows".
(53) the schools show plays here

The clause "the schools show plays here" is a statement.
The phrase "here" is locative phrase modifying the verb "show".
The phrase "plays" is a noun phrase and the direct object of the verb "show".
The phrase "the schools" is a noun phrase and the subject of the verb "show".
The word "Ø" is an abstract empty determiner specifying the noun "plays".
The word "plays" is a plural count noun.
The word "plays" is the head of the noun phrase "plays".
The word "schools" is the plural count noun.
The word "shows" is the head of the noun phrase "the schools".
The word "show" is a present tense verb.
The word "the" is a determiner specifying the noun "schools".
The word "here" is a locative quantifier modifying the verb "show".

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C3        N0        C0        V1
| NOUN2    TNS
| schools  PRS
|  |
| C0
|  V0        N3        N0
DEn3   VERB1
the
  show
  |
  |
  |
|  NOUN2
|    plays
|  C0
DEn3
Ø

(54) the schools shows plays here

This sentence is not correct: the subject "schools" is plural and the verb "shows" is singular.

The clause "the schools shows plays here" is a statement.
The phrase "here" is locative phrase modifying the verb "shows".
The phrase "plays" is a noun phrase and the direct object of the verb "shows".
The phrase "the schools" is a noun phrase and the subject of the verb "shows".
The word "Ø" is an abstract empty determiner specifying the noun "plays".
The word "plays" is a plural count noun.
The word "plays" is the head of the noun phrase "plays".
The word "schools" is the plural count noun.
The word "shows" is a third person singular present tense verb.
The word "shows" is the main verb of "the schools shows plays here".
The word "the" is a determiner specifying the noun "schools".
The word "here" is a locative quantifier modifying the verb "shows".

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C3        N0        C0        V1
| NOUN2    TNS
| schools  PRS
|  |
| C0
|  V0        N3        N0
DEn3   VERB2
the
  shows
  |
  |
  |
|  NOUN2
|    plays
|  C0
DEn3
Ø
SAMPLE PARSES ILLUSTRATING RELATIONSHIPS BETWEEN SENTENCES

(55) they fed her dog biscuits

The clause "they fed her dog biscuits" is a statement.
The phrase "dog biscuits" is a noun phrase and the direct object of the verb "fed".
The phrase "her" is a noun phrase and the indirect object of the verb "fed".
The phrase "they" is a noun phrase and the subject of the verb "fed".
The word "biscuits" is a plural count noun.
The word "biscuits" is the head of the noun phrase "dog biscuits".
The word "dog" is a singular count noun.
The word "dog" is the head of the noun phrase "dog".
The word "fed" is a past tense verb.
The word "fed" is the main verb of "they fed her dog biscuits".
The word "her" is a third person singular feminine object pronoun.
The word "Ø" is an abstract empty determiner specifying the noun "biscuits".
The word "they" is a third person plural subject pronoun.
(56) they fed dog biscuits to her

The clause "they fed dog biscuits to her" is a statement.
The phrase "dog biscuits" is a noun phrase and the direct object of the verb "fed".
The phrase "her" is a noun phrase and the object of the preposition "to".
The phrase "they" is a noun phrase and the subject of the verb "fed".
The phrase "to her" is a prepositional phrase and a complement of the verb "fed".
The word "biscuits" is a plural count noun.
The word "biscuits" is the head of the noun phrase "dog biscuits".
The word "dog" is a noun forming a compound noun with "biscuits".
The word "dog" is a singular count noun.
The word "dog" is the head of the noun phrase "dog".
The word "fed" is a past tense verb.
The word "fed" is the main verb of "they fed dog biscuits to her".
The word "her" is a third person singular feminine object pronoun.
The word "Ø" is an abstract empty determiner specifying the noun "biscuits".
The word "they" is a third person plural subject pronoun.
The word "to" is a preposition introducing the prepositional phrase "to her".

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N3        C3        V1
|         |         |-----------------------------|---------|
|         |         |                             |         |
N0        C0        V0        N3        C3
NOM2C      TNS       VERB3
they      PST        fed
|         |         |---------|---------|
|         |         |         |         |
C3        N1        C1
|         |         |---------|---------|
|         |         |         |         |
C0        N3        N0        C0        N3
DETPHI    NOUN2      PRPTO
Ø        |         |         |
biscuits  to        |
N0        N0
NOUN1      ACC
dog
her

(57) they fed biscuits to her dog

The clause "they fed biscuits to her dog" is a statement.
The phrase "biscuits" is a noun phrase and the direct object of the verb "fed".
The phrase "her dog" is a noun phrase and the object of the preposition "to".
The phrase "her" is a possessive phrase specifying "dog".
The phrase "they" is a noun phrase and the subject of the verb "fed".
The phrase "to her dog" is a prepositional phrase and a complement of the verb "fed".
The word "biscuits" is a plural count noun.
The word "biscuits" is the head of the noun phrase "biscuits".
The word "dog" is a singular count noun.
The word "dog" is the head of the noun phrase "her dog".
The word "fed" is a past tense verb.
The word "fed" is the main verb of "they fed biscuits to her dog".
The word "her" is a third person singular feminine possessive pronoun.
The word "Ø" is an abstract empty determiner specifying the noun "biscuits".
The word "POS" is a determiner specifying the noun "dog".
The word "they" is a third person plural subject pronoun.
The word "to" is a preposition introducing the prepositional phrase "to her dog".

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N3        C3        V1
|         |         |-----------------------------|---------|
|         |         |                             |         |
N0        C0        V0        N3        C3
NOM2C      TNS       VERB3
they      PST        fed
|         |         |---------|---------|
|         |         |         |         |
C3        N0        C1
|         |         |---------|---------|
|         |         |         |         |
C0        N3        N0        C0        N3
DETPHI    NOUN2      PRPTO
Ø        |         |         |
biscuits  to        |
N0        N0
NOUN1      ACC
dog
her

her POS
The clause "she was fed dog biscuits by them" is a statement.
The phrase "by them" is a prepositional phrase and a modifier of the verb "fed".
The phrase "dog biscuits" is a noun phrase and the direct object of the verb "fed".
The phrase "fed dog biscuits by them" is a participial phrase expressing the passive voice of the verb.
The phrase "she" is a noun phrase and the subject of the verb "was".
The phrase "them" is a noun phrase and the object of the preposition "by".
The phrase "[e]" is an abstract empty noun phrase and the indirect object of the verb "fed".
The word "biscuits" is a plural count noun.
The word "biscuits" is the head of the noun phrase "dog biscuits".
The word "by" is a preposition introducing the prepositional phrase "by them".
The word "dog" is a noun forming a compound noun with "biscuits".
The word "dog" is a singular count noun.
The word "dog" is the head of the noun phrase "dog".
The word "fed" is a passive participle.
The word "Ø" is an abstract empty determiner specifying the noun "biscuits".
The word "them" is a third person plural object pronoun.
The word "was" is a past tense verb.
The word "was" is an auxiliary verb expressing the passive voice together with the passive participle "fed".
The word "was" is the main verb of "she was fed dog biscuits by them".
The word "[-ed]" is the abstract marker for the passive participle.
(59) dog biscuits were fed to her by them

The clause "dog biscuits were fed to her by them" is a statement.
The phrase "by them" is a prepositional phrase and a modifier of the verb "fed".
The phrase "dog biscuits" is a noun phrase and the subject of the verb "were".
The phrase "fed to her by them" is a participial phrase expressing the passive voice of the verb.
The phrase "her" is a noun phrase and the object of the preposition "to".
The phrase "them" is a noun phrase and the object of the preposition "by".
The phrase "to her" is a prepositional phrase and a complement of the verb "fed".
The phrase "[e]" is an abstract empty noun phrase and the direct object of the verb "fed".
The word "biscuits" is a plural count noun.
The word "biscuits" is the head of the noun phrase "dog biscuits".
The word "by" is a preposition introducing the prepositional phrase "by them".
The word "dog" is a noun forming a compound noun with "biscuits".
The word "dog" is a singular count noun.
The word "dog" is the head of the noun phrase "dog".
The word "fed" is a passive participle.
The word "fed" is an abstract empty determiner specifying the noun "biscuits".
The word "them" is a third person plural object pronoun.
The word "to" is a preposition introducing the prepositional phrase "to her".
The word "were" is a past tense verb.
The word "were" is an auxiliary verb expressing the passive voice together with the passive participle "fed".
The word "were" is the main verb of "dog biscuits were fed to her by them".
The word "[-ed]" is the abstract marker for the passive participle.
(60) eventually the passengers all must strictly obey the stewardess

The clause "eventually the passengers all must strictly obey the stewardess" is a statement.
The phrase "the passengers" is a noun phrase and the subject of the verb "obey".
The phrase "the stewardess" is a noun phrase and the direct object of the verb "obey".
The word "all" is a floating quantifier specifying the noun "passengers".
The word "eventually" is a sentence adverb modifying the clause "the passengers all must strictly obey the stewardess".
The word "must" is a modal auxiliary specifying the meaning of the verb "obey".
The word "obey" is the main verb of "eventually the passengers all must strictly obey the stewardess".
The word "passengers" is a plural count noun.
The word "passengers" is the head of the noun phrase "the passengers".
The word "stewardess" is a singular count noun.
The word "stewardess" is the head of the noun phrase "the stewardess".
The word "strictly" is a manner adverb modifying the verb "obey".
The word "the" is a determiner specifying the noun "passengers".

(61) the passengers all must eventually strictly obey the stewardess

The clause "the passengers all must eventually strictly obey the stewardess" is a statement.
The phrase "the passengers" is a noun phrase and the subject of the verb "obey".
The phrase "the stewardess" is a noun phrase and the direct object of the verb "obey".
The word "all" is a floating quantifier specifying the noun "passengers".
The word "eventually" is a sentence adverb modifying the clause "the passengers all must strictly obey the stewardess".
The word "must" is a modal auxiliary specifying the meaning of the verb "obey".
The word "obey" is the main verb of "the passengers all must eventually strictly obey the stewardess".
The word "passengers" is a plural count noun.
The word "passengers" is the head of the noun phrase "the passengers".
The word "stewardess" is a singular count noun.
The word "stewardess" is the head of the noun phrase "the stewardess".
The word "strictly" is a manner adverb modifying the verb "obey".
The word "the" is a determiner specifying the noun "passengers".
(62) eventually the passengers must so all obey the stewardess strictly

The clause "eventually the passengers must so all obey the stewardess strictly" is a statement.
The phrase "the passengers" is a noun phrase and the subject of the verb "obey".
The word "must" is a modal auxiliary specifying the meaning of the verb "obey".
The word "all" is a floating quantifier specifying the noun "passengers".
The word "eventually" is a sentence adverb modifying the clause "the passengers must so all obey
the stewardess strictly".
The word "so" is an emphatic specifying the modal "must".
The word "obey" is the main verb of "eventually the passengers must so all obey the stewardess
strictly".
The word "the" is the head of the noun phrase "the passengers".
The word "passengers" is a plural count noun.
The word "passengers" is the head of the noun phrase "the passengers".
The word "stewardess" is a singular count noun.
The word "stewardess" is the head of the noun phrase "the stewardess".
The word "strictly" is a manner adverb modifying the verb "obey".
The word "the" is a determiner specifying the noun "passengers".
The word "the" is a determiner specifying the noun "stewardess".

(63) all the passengers must obey the stewardess strictly eventually

The clause "all the passengers must obey the stewardess strictly eventually" is a statement.
The phrase "all the passengers" is a noun phrase and the subject of the verb "obey".
The word "must" is a modal auxiliary specifying the meaning of the verb "obey".
The word "all" is a floating quantifier specifying the noun "passengers".
The word "eventually" is a sentence adverb modifying the clause "all the passengers must obey
the stewardess strictly".
The word "obey" is the main verb of "all the passengers must obey the stewardess strictly
eventually".
The word "the" is a determiner specifying the noun "passengers".
The word "the" is the head of the noun phrase "the stewardess".
The word "stewardess" is a singular count noun.
The word "the" is the head of the noun phrase "the stewardess".
The word "strictly" is a manner adverb modifying the verb "obey".
The word "the" is a determiner specifying the noun "stewardess".

V3 | -------------------------------------------------------------|
   | V3 |
   | C3 |
   | C0 N3 C3 V2 |
ADV4 | 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|--|
SAMPLE PARSES ILLUSTRATING THE ENGLISH AUXILIARY

(64) IMPERATIVE TENSE: interview them

The clause "interview them" is a command with an understood subject [you].
The phrase "them" is a noun phrase and the direct object of the verb "interview".
The word "interview" is the main verb of "interview them".
The word "them" is a third person plural object pronoun.
The word "[you]" is the empty subject noun phrase of the verb "interview".

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N3        C3        V1
|         |         |---------|
|         |         |         |
N0        C0        V0        N3
NEMPU     TNS     VERB1A       |
[you]     IMP    interview    |
N0
ACC
them

(65) PRESENT TENSE: he interviews them

The clause "he interviews them" is a statement.
The phrase "he" is a noun phrase and the subject of the verb "interviews".
The phrase "them" is a noun phrase and the direct object of the verb "interviews".
The word "he" is a third person singular masculine subject pronoun.
The word "interviews" is a third person singular present tense verb.
The word "interviews" is the main verb of "he interviews them".
The word "them" is a third person plural object pronoun.

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N3        C3        V1
|         |         |---------|
|         |         |         |
N0        C0        V0        N3
NOM1C     TNS       VERB2       |
he       PRS    interviews    |
N0
ACC
them

(66) PAST TENSE: he interviewed them

The clause "he interviewed them" is a statement.
The phrase "he" is a noun phrase and the subject of the verb "interviewed".
The phrase "them" is a noun phrase and the direct object of the verb "interviewed".
The word "he" is a third person singular masculine subject pronoun.
The word "interviewed" is a past tense verb.
The word "interviewed" is the main verb of "he interviewed them".
The word "them" is a third person plural object pronoun.

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N3        C3        V1
|         |         |---------|
|         |         |         |
N0        C0        V0        N3
NOM1C     TNS       VERB3       |
he       PST   interviewed    |
N0
ACC
them
(67) FUTURE TENSE: he will interview them

The clause "he will interview them" is a statement.
The phrase "he" is a noun phrase and the subject of the verb "interview".
The phrase "them" is a noun phrase and the direct object of the verb "interview".
The word "he" is a third person singular masculine subject pronoun.
The word "interview" is the main verb of "he will interview them".
The word "them" is a third person plural object pronoun.
The word "will" is a modal auxiliary specifying the meaning of the verb "interview"

(68) CONDITIONAL TENSE: he should interview them

The clause "he should interview them" is a statement.
The phrase "he" is a noun phrase and the subject of the verb "interview".
The phrase "them" is a noun phrase and the direct object of the verb "interview".
The word "he" is a third person singular masculine subject pronoun.
The word "interview" is the main verb of "he should interview them".
The word "should" is a modal auxiliary specifying the meaning of the verb "interview".
The word "them" is a third person plural object pronoun.
(69) **PRESENT TENSE + PERFECTIVE ASPECT**: he has interviewed them

The clause "he has interviewed them" is a statement.
The phrase "he" is a noun phrase and the subject of the verb "interviewed".
The phrase "them" is a noun phrase and the direct object of the verb "interviewed".
The word "has" is an auxiliary verb expressing the perfective aspect together with the perfective participle "interviewed".
The word "he" is a third person singular masculine subject pronoun.
The word "interviewed" is a perfective participle.
The word "interviewed" is the main verb of "he has interviewed them".

(70) **PRESENT TENSE + PROGRESSIVE ASPECT**: he is interviewing them

The clause "he is interviewing them" is a statement.
The phrase "he" is a noun phrase and the subject of the verb "is".
The phrase "interviewing them" is a participial phrase expressing the progressive aspect of the verb.
The phrase "them" is a noun phrase and the direct object of the verb "interviewing".
The word "he" is a third person singular masculine subject pronoun.
The word "interviewing" is a progressive participle.
The word "is" is a third person singular present tense verb.
The word "is" is an auxiliary verb expressing the progressive aspect together with the progressive participle "interviewing".
The word "is" is the main verb of "he is interviewing them".
The word "[-ing]" is the abstract marker for the progressive participle.
(71) PAST TENSE + PASSIVE VOICE: they were interviewed by him

The clause "they were interviewed by him" is a statement.
The phrase "by him" is a prepositional phrase and a modifier of the verb "interviewed".
The phrase "him" is a noun phrase and the object of the preposition "by".
The phrase "interviewed by him" is a participial phrase expressing the passive voice of the verb.
The phrase "they" is a noun phrase and the subject of the verb "were".
The phrase "[e]" is an abstract empty noun phrase and the direct object of the verb "interviewed".
The word "by" is a preposition introducing the prepositional phrase "by him".
The word "him" is a third person singular masculine object pronoun.
The word "interviewed" is a passive participle.
The word "they" is a third person plural subject pronoun.
The word "were" is a third person plural past tense verb.
The word "were" is an auxiliary verb expressing the passive voice together with the passive participle "interviewed".
The word "were" is the main verb of "they were interviewed by him".
The word "[-ed]" is the abstract marker for the passive participle.
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(72) **CONDITIONAL TENSE + PERFECTIVE PROGRESSIVE ASPECT:**

he should have been interviewing them

The clause "he should have been interviewing them" is a statement.
The phrase "he" is a noun phrase and the subject of the verb "been".
The phrase "interviewing them" is a participial phrase expressing the progressive aspect of the verb.
The phrase "interviewing them" is an adjective phrase describing the subject "he".
The phrase "them" is a noun phrase and the direct object of the verb "interviewing".
The word "been" is a perfective participle.
The word "been" is an auxiliary verb expressing the progressive aspect together with the progressive participle "interviewing".
The word "been" is the main verb of "he should have been interviewing them".
The word "have" is an auxiliary verb expressing the perfective aspect together with the perfective participle "been".
The word "he" is a third person singular masculine subject pronoun.
The word "interviewing" is a progressive participle.
The word "should" is a modal auxiliary specifying the meaning of the verb "been".
The word "them" is a third person plural object pronoun.
The word "[-ing]" is the abstract marker for the progressive participle.
they might have been interviewed by him

The clause "they might have been interviewed by him" is a statement.
The phrase "by him" is a prepositional phrase and a modifier of the verb "interviewed".
The phrase "interviewed by him" is a participle phrase expressing the passive voice of the verb.
The phrase "interviewed by him" is an adjective phrase describing the subject "they".
The phrase "they" is a noun phrase and the subject of the verb "been".
The phrase "been" is an abstract empty noun phrase and direct object of the verb "interviewed".
The word "been" is a perfective participle.
The word "by" is an auxiliary verb expressing the passive voice together with the passive participle "interviewed".
The word "they" is a third person plural subject pronoun.
The word "might" is a modal auxiliary specifying the meaning of the verb "been".
The word "interviewed" is a passive participle.
The word "interviewed" is a third person singular masculine object pronoun.
The word "them" is the abstract marker for the passive participle.
The clause "they really couldn't all have been being interviewed by him" is a statement.
The phrase "being interviewed by him" is a participial phrase expressing the progressive aspect
of the verb.
The phrase "by him" is a prepositional phrase and a modifier of the verb "interviewed".
The phrase "interviewed" is a verb phrase expressing the passive voice of the verb.
The phrase "they" is a noun phrase and the object of the preposition "by".
The phrase "interviewed by him" is a participial phrase expressing the passive voice of the verb.
The phrase "by" is a preposition introducing the prepositional phrase "by him".
The phrase "him" is a noun phrase and the object of the preposition "by".
The word "him" is a third person singular masculine object pronoun.
The word "interviewed" is a verb phrase expressing the passive voice of the verb.
The word "interviewed" is passive.
The word "they" is a third person plural subject pronoun.
The word "w" is a third person singular masculine object pronoun.
The word "interviewed" is a verb phrase expressing the passive voice of the verb.
The word "interviewed" is passive.

The word "being" is a progressive participle.
The word "being" is an auxiliary verb expressing the progressive aspect together with the
progressive participle "being".
The word "being" is the main verb of "they really couldn't all have been being interviewed by
him".
The word "being" is a passive participle.
The word "by" is a preposition introducing the prepositional phrase "by him".
The word "interviewed" is passive.
The word "could" is a modal auxiliary specifying the meaning of the verb "been".
The word "have" is an auxiliary verb expressing the perfective aspect together with the
perfective participle "been".
The word "them" is a third person singular masculine object pronoun.
The word "interviewed" is passive.
The word "by" is a preposition introducing the prepositional phrase "by him".
The word "interviewed" is passive.
The word "really" is a sentence adverb modifying the clause "they couldn't all have been being
interviewed by him".
The word "them" is a third person plural subject pronoun.
The word "[-ed]" is the abstract marker for the passive participle.
The word "[-ing]" is the abstract marker for the progressive participle.
they each could so probably have been being interviewed by him
SAMPLE PARSES ILLUSTRATING DIRECT YES/NO QUESTIONS

(76) does she admire them

The clause "does she admire them" is yes/no question.
The phrase "she" is a noun phrase and the subject of the verb "admire".
The phrase "them" is a noun phrase and the direct object of the verb "admire".
The word "admire" is the main verb of "does she admire them".
The word "does" is a modal auxiliary specifying the meaning of the verb "admire".
The word "she" is a third person singular feminine subject pronoun.
The word "them" is a third person plural object pronoun.

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C3i                           V3
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C0        N3        C3i       V1
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|         |         |         |         |         |
|         |         |         |         |         |
V3        C0        N0        C0        V0        N3 |
| TNS      NOM1C    ETNS      MVERB      |
| PRS      she       [e]      admire     |
|                                                 |
V0                                                 N0
MODAL                                              ACC
does

(77) should she admire them

The clause "should she admire them" is yes/no question.
The phrase "she" is a noun phrase and the subject of the verb "admire".
The phrase "them" is a noun phrase and the direct object of the verb "admire".
The word "admire" is the main verb of "should she admire them".
The word "she" is a third person singular feminine subject pronoun.
The word "should" is a modal auxiliary specifying the meaning of the verb "admire".
The word "them" is a third person plural object pronoun.

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C3i                           V3
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|         |         |         |
|         |         |         |
C0        N3        C3i       V1
|---------|         |         |         |---------|
|         |         |         |         |         |
|         |         |         |         |         |
V3        C0        N0        C0        V0        N3 |
| TNS      NOM1C    ETNS      MVERB      |
| CND      she       [e]      admire     |
|                                                 |
V0                                                 N0
MODAL                                              ACC
should

them
(78) has she admired them

The clause "has she admired them" is yes/no question.
The phrase "she" is a noun phrase and the subject of the verb "admired".
The phrase "them" is a noun phrase and the direct object of the verb "admired".
The word "admired" is a perfective participle.
The word "admired" is the main verb of "has she admired them".
The word "she" is a third person singular feminine subject pronoun.
The word "has" is an auxiliary verb expressing the perfective aspect together with the perfective participle "admired".
The word "them" is a third person plural object pronoun.

(79) is she admiring them

The clause "is she admiring them" is yes/no question.
The phrase "admiring them" is an adjective phrase describing the subject "she".
The phrase "admiring them" is a participial phrase expressing the progressive aspect of the verb.
The phrase "she" is a noun phrase and the subject of the verb "[e]".
The phrase "admiring them" is a noun phrase and the direct object of the verb "admiring".
The word "she" is a third person singular feminine subject pronoun.
The word "[e]" is the abstract empty main verb of "is she admiring them".
The word "[-ing]" is the abstract marker for the progressive participle.
The word "is" is an auxiliary verb expressing the progressive aspect together with the progressive participle "admiring".
The word "admiring" is a progressive participle.
The word "them" is a third person plural object pronoun.
SAMPLE PARSES ILLUSTRATING DIRECT WH-QUESTIONS

(80) who does she admire

The clause "who does she admire" is a WH-question.
The phrase "she" is a noun phrase and the subject of the verb "admire".
The phrase "[e]" is an abstract empty noun phrase and the direct object of the verb "admire".
The word "admire" is the main verb of "who does she admire".
The word "does" is a modal auxiliary specifying the meaning of the verb "admire".
The word "who" is an interrogative pronoun.

(81) why does she admire them

The clause "why does she admire them" is a WH-question.
The phrase "she" is a noun phrase and the subject of the verb "admire".
The phrase "them" is a noun phrase and the direct object of the verb "admire".
The phrase "[e]" is the referent of "why" and the empty modifier phrase of the verb "went".
The word "admire" is the main verb of "why does she admire them".
The word "does" is a modal auxiliary specifying the meaning of the verb "admire".
The word "she" is a third person singular feminine subject pronoun.
The word "them" is a third person plural object pronoun.
The word "why" is an interrogative pronoun.
ACC
them
when did she admire them

who admires them
SAMPLE PARSES ILLUSTRATING THE INTERNAL STRUCTURE OF NOUN PHRASES

(84) those guests left quickly

The clause "those guests left quickly" is a statement.
The phrase "those guests" is a noun phrase and the subject of the verb "left".
The word "guests" is a plural count noun.
The word "guests" is the head of the noun phrase "the guests".
The word "left" is the main verb of "those guests left quickly".
The word "left" is a past tense verb
The word "quickly" is a manner adverb modifying the verb "left".
The word "those" is a determiner specifying the noun "guests".

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(85) guests left quickly

The clause "guests left quickly" is a statement.
The phrase "guests" is a noun phrase and the subject of the verb "left".
The word "left" is the main verb of "guests left quickly".
The word "left" is a past tense verb
The word "Ø" is an abstract empty determiner specifying the noun "guests".
The word "guests" is a plural count noun.
The word "guests" is the head of the noun phrase "guests".
The word "quickly" is a manner adverb modifying the verb "left".

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those quickly
(86) some guests left quickly

The clause "some guests left quickly" is a statement.
The phrase "some guests" is a noun phrase and the subject of the verb "left".
The word "guests" is a plural count noun.
The word "guests" is the head of the noun phrase "some guests".
The word "left" is the main verb of "some guests left quickly".
The word "left" is a past tense verb
The word "Ø" is an abstract empty determiner specifying the noun "guests".
The word "quickly" is a manner adverb modifying the verb "left".
The word "some" is a quantifier specifying the noun "guests".

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|         | guests   PST   left   |
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N0   C0
QNTNOM  DETPHI  ADV1
some   Ø

(87) half the guests left quickly

The clause "half the guests left quickly" is a statement.
The phrase "half the guests" is a noun phrase and the subject of the verb "left".
The word "guests" is a plural count noun.
The word "guests" is the head of the noun phrase "half the guests".
The word "half" is a quantifier specifying the noun "guests".
The word "left" is the main verb of "half the guests left quickly".
The word "left" is a past tense verb.
The word "quickly" is a manner adverb modifying the verb "left".
The word "the" is a determiner specifying the noun "guests".

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N3   C3   N0   C0   V0   C3
|         | NOUN2   TNS   VERB3   |
|         | guests   PST   left   |
|         |         |         |         |
|         |         |         |         |
N0   C0
QNTFRAC T DET3 ADV1
half   the   quickly
all the guests left quickly

The clause "all the guests left quickly" is a statement.
The phrase "all the guests" is a noun phrase and the subject of the verb "left".
The word "all" is a quantifier specifying the noun "guests".
The word "guests" is the head of the noun phrase "all the guests".
The word "left" is the main verb of "all the guests left quickly".
The word "left" is a past tense verb.
The word "quickly" is a manner adverb modifying the verb "left".
The word "the" is a determiner specifying the noun "guests".

john's guests left quickly

The clause "john's guests left quickly" is a statement.
The phrase "john's guests" is a noun phrase and the subject of the verb "left".
The word "guests" is a plural count noun.
The word "guests" is the head of the noun phrase "john's guests".
The word "john" is a proper noun.
The word "left" is the main verb of "john's guests left quickly".
The word "left" is a past tense verb.
The word "POS" is a determiner specifying the noun "guests".
The word "quickly" is a manner adverb modifying the verb "left".
(90) their guests left quickly

The clause "their guests left quickly" is a statement.
The phrase "their guests" is a noun phrase and the subject of the verb "left".
The phrase "their" is a possessive phrase specifying "guests".
The word "guests" is the head of the noun phrase "their guests".
The word "guests" is a plural count noun.
The word "left" is the main verb of "their guests left quickly".
The word "left" is a past tense verb.
The word "POS" is a determiner specifying the noun "guests".
The word "quickly" is a manner adverb modifying the verb "left".
The word "their" is a third person plural possessive pronoun.

(91) all their guests left quickly

The clause "all their guests left quickly" is a statement.
The phrase "all their guests" is a noun phrase and the subject of the verb "left".
The phrase "all" is a quantifier specifying the noun "guests".
The word "all" is a quantifier specifying the noun "guests".
The word "guests" is a plural count noun.
The word "guests" is the head of the noun phrase "all their guests".
The word "left" is a past tense verb.
The word "left" is the main verb of "all their guests left quickly".
The word "POS" is a determiner specifying the noun "guests".
The word "quickly" is a manner adverb modifying the verb "left".
The word "their" is a third person plural possessive pronoun.
(92) those six unhappy guests left quickly

The clause "those six unhappy guests left quickly" is a statement.
The phrase "those six unhappy guests" is a noun phrase and the subject of the verb "left".
The word "guests" is a plural count noun.
The word "guests" is the head of the noun phrase "those six unhappy guests".
The word "left" is the main verb of "those six unhappy guests left quickly".
The word "quickly" is a manner adverb modifying the verb "left".
The word "six" is a numeral specifying the noun "guests".
The word "those" is a determiner specifying the noun "guests".
The word "unhappy" is an adjective modifying the noun "guests".

(93) the messy house guests finally left

The clause "the messy house guests finally left" is a statement.
The phrase "the messy house guests" is a noun phrase and the subject of the verb "left".
The word "finally" is a sentence adverb modifying the clause "the messy house guests left".
The word "guests" is the head of the noun phrase "the messy house guests".
The word "guests" is a plural count noun.
The word "house" is the head of the noun phrase "house".
The word "house" is a singular count noun.
The word "house" is a noun forming a compound noun with "guests".
The word "left" is a past tense verb.
The word "left" is the main verb of "the messy house guests finally left".
The word "messy" is an adjective modifying the noun "guests".
The word "the" is a determiner specifying the noun "guests".

307
all the teachers with moustaches resigned

The clause "all the teachers with moustaches resigned" is a statement.
The phrase "all the teachers with moustaches" is a noun phrase and the subject of the verb "resigned".
The phrase "moustaches" is a noun phrase and the object of the preposition "with".
The phrase "with moustaches" is a prepositional phrase and a modifier of the noun "teachers".
The word "all" is a quantifier specifying the noun "teachers".
The word "moustaches" is the head of the noun phrase "moustaches".
The word "moustaches" is a plural count noun.
The word "Ø" is an abstract empty determiner specifying the noun "moustaches".
The word "resigned" is the main verb of "all the teachers with moustaches resigned".
The word "resigned" is a past tense verb.
The word "teachers" is a plural count noun.
The word "teachers" is the head of the noun phrase "all the teachers with moustaches".
The word "the" is a determiner specifying the noun "teachers".
The word "with" is a preposition introducing the prepositional phrase "with moustaches".
(95) the spanish teacher resigned

The clause "the spanish teacher resigned" is a statement.
The phrase "the spanish teacher" is a noun phrase and the subject of the verb "resigned".
The word "resigned" is the main verb of "the spanish teacher resigned".
The word "resigned" is a past tense verb.
The word "spanish" is an adjective modifying the noun "teacher".
The word "teacher" is a singular count noun.
The word "teacher" is the head of the noun phrase "the spanish teacher".
The word "the" is a determiner specifying the noun "teacher".
the american history teacher resigned

The clause "the american history teacher resigned" is a statement.
The phrase "the american history teacher" is a noun phrase and the subject of the verb "resigned".
The word "american" is an adjective modifying the noun "teacher".
The word "history" is a singular mass noun.
The word "history" is a noun forming a compound noun with "teacher".
The word "history" is the head of the noun phrase "history".
The word "resigned" is a past tense verb.
The word "resigned" is the main verb of "the american history teacher resigned".
The word "teacher" is the head of the noun phrase "the american history teacher".
The word "teacher" is a singular count noun.
The word "the" is a determiner specifying the noun "teacher".
(97) the teacher from spain resigned

The clause "the teacher from spain resigned" is a statement.
The phrase "from spain" is a prepositional phrase and a modifier of the noun "teacher".
The phrase "spain" is a noun phrase and the object of the preposition "from".
The phrase "the teacher from spain" is a noun phrase and the subject of the verb "resigned".
The word "from" is a preposition introducing the prepositional phrase "from spain".
The word "resigned" is the main verb of "the teacher from spain resigned".
The word "resigned" is a past tense verb.
The word "spain" is a proper noun.
The word "teacher" is a singular count noun.
The word "teacher" is the head of the noun phrase "the teacher from spain".
The word "the" is a determiner specifying the noun "teacher".
The clause "that beautiful grand piano was a gift" is a statement.
The phrase "a gift" is a noun phrase and a predicate nominative modifying the subject "piano".
The phrase "that beautiful grand piano" is a noun phrase and the subject of the verb "was".
The word "a" is a determiner specifying the noun "gift".
The word "beautiful" is an adjective modifying the noun "piano".
The word "gift" is a singular count noun.
The word "piano" is a singular count noun.
The word "was" is the head of the noun phrase "a gift".
The word "grand" is an adjective modifying the noun "piano".
The word "piano" is the head of the noun phrase "that beautiful grand piano".
The word "that" is a determiner specifying the noun "piano".
The word "was" is a past tense verb.
The word "was" is the main verb of "that beautiful grand piano was a gift".
(99) the quick brown fox jumped over the lazy dog

The clause "the quick brown fox jumped over the lazy dog" is a statement.
The phrase "over the lazy dog" is a prepositional phrase and a modifier of the verb "jumped".
The phrase "the lazy dog" is a noun phrase and the object of the preposition "over".
The phrase "the quick brown fox" is a noun phrase and the subject of the verb "jumped".
The word "brown" is an adjective modifying the noun "fox".
The word "dog" is the head of the noun phrase "the lazy dog".
The word "fox" is the head of the noun phrase "the quick brown fox".
The word "fox" is a singular count noun.
The word "dog" is a singular count noun.
The word "jumped" is the main verb of "the quick brown fox jumped over the lazy dog".
The word "jumped" is a past tense verb.
The word "lazy" is an adjective modifying the noun "dog".
The word "over" is a preposition introducing the prepositional phrase "over the lazy dog".
The word "quick" is an adjective modifying the noun "fox".
The word "the" is a determiner specifying the noun "fox".
The word "the" is a determiner specifying the noun "dog".
The clause "the soprano from a small town in France fell into the orchestra pit" is a statement.
The phrase "a small town in France" is a noun phrase and the object of the preposition "from".
The phrase "France" is a noun phrase and the object of the preposition "in".
The phrase "from a small town in France" is a prepositional phrase and a modifier of the noun "soprano".
The phrase "into the orchestra pit" is a prepositional phrase and a modifier of the verb "fell".
The phrase "the orchestra pit" is a noun phrase and the object of the preposition "into".
The phrase "the soprano from a small town in France" is a noun phrase and the subject of the verb "fell".
The word "a" is a determiner specifying the noun "town".
The word "fell" is a past tense verb.
The word "fell" is the main verb of "the soprano from a small town in France fell into the orchestra pit".
The word "France" is a proper noun.
The word "from" is a preposition introducing the prepositional phrase "from a small town in France".
The word "into" is a preposition introducing the prepositional phrase "in France".
The word "orchestra" is a noun forming a compound noun with "pit".
The word "orchestra" is a singular count noun.
The word "orchestra" is the head of the noun phrase "orchestra".
The word "pit" is a singular count noun.
The word "pit" is the head of the noun phrase "the orchestra pit".
The word "small" is an adjective modifying the noun "town".
The word "soprano" is a singular count noun.
The word "soprano" is the head of the noun phrase "the soprano from a small town in France".
The word "the" is a determiner specifying the noun "pit".
The word "the" is a determiner specifying the noun "soprano".
The word "town" is the head of the noun phrase "a small town in France".
The word "town" is a singular count noun.
(101) the baby sleeping in the crib looks peaceful

The clause "the baby sleeping in the crib looks peaceful" is a statement.
The phrase "in the crib" is a prepositional phrase and a modifier of the verb "sleeping".
The phrase "peaceful" is an adjective phrase describing the subject "baby".
The phrase "sleeping in the crib" is a progressive participle phrase modifying the noun "baby".
The phrase "the baby sleeping in the crib" is a noun phrase and the subject of the verb "looks".
The phrase "the crib" is a noun phrase and the object of the preposition "in".
The word "baby" is a singular count noun.
The word "baby" is the head of the noun phrase "the baby sleeping in the crib".
The word "crib" is a singular count noun.
The word "crib" is the head of the noun phrase "the crib".
The word "in" is a preposition introducing the prepositional phrase "in the crib".
The word "looks" is a third person singular present tense verb.
The word "looks" is the main verb of "the baby sleeping in the crib looks peaceful".
The word "peaceful" is an adjective.
The word "sleeping" is a progressive participle.
The word "the" is a determiner specifying the noun "crib".
The word "the" is a determiner specifying the noun "baby".
The word "[-ing]" is the abstract marker for the progressive participle.
The clause "the ball thrown by the boy broke a window" is a statement.
The phrase "a window" is a noun phrase and the direct object of the verb "broke".
The phrase "by the boy" is a prepositional phrase and a modifier of the verb "thrown".
The phrase "the ball thrown by the boy" is a passive participle phrase modifying the noun "ball".
The phrase "[e]" is an abstract empty noun phrase and the direct object of the verb "thrown".
The word "a" is a determiner specifying the noun "window".
The word "ball" is a singular count noun.
The word "ball" is the head of the noun phrase "the ball thrown by the boy".
The word "boy" is a singular count noun.
The word "boy" is the head of the noun phrase "the boy".
The word "broke" is a past tense verb.
The word "broke" is the main verb of "the ball thrown by the boy broke a window".
The word "by" is a preposition introducing the prepositional phrase "by the boy".
The word "the" is a determiner specifying the noun "ball".
The word "thrown" is a passive participle.
The word "window" is a singular count noun.
The word "window" is the head of the noun phrase "a window".
The word "[e]" is the abstract marker for the passive participle.
SAMPLE PARSES ILLUSTRATING SPECIFIERS IN NOUN PHRASES

(103) some people like that stuff

The clause "some people like that stuff" is a statement.
The phrase "some people" is a noun phrase and the subject of the verb "like".
The phrase "that stuff" is a noun phrase and the direct object of the verb "like".
The word "like" is a present tense verb.
The word "like" is the main verb of "some people like that stuff".
The word "Ø" is an abstract empty determiner specifying the noun "people".
The word "people" is a plural count noun.
The word "people" is the head of the noun phrase "some people".
The word "some" is a quantifier specifying the noun "people".
The word "stuff" is a singular mass noun.
The word "stuff" is the head of the noun phrase "that stuff".
The word "that" is a determiner specifying the noun "stuff".

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(104) some like that

The clause "some like that" is a statement.
The phrase "that" is a noun phrase and the direct object of the verb "like".
The phrase "some" is a noun phrase and the subject of the verb "like".
The word "like" is the main verb of "some like that".
The word "like" is a present tense verb.
The word "Ø" is an abstract empty determiner specifying the noun "[u]".
The word "some" is a quantifier specifying the noun "[u]".
The word "that" is a determiner specifying the noun "[u]".
The word "[u]" is the abstract empty head of the noun phrase "some".
The word "[u]" is the abstract empty subject of the verb "like".
The word "[u]" is the abstract empty head of the noun phrase "that".

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(103) some people like that stuff

The clause "some people like that stuff" is a statement.
The phrase "some people" is a noun phrase and the subject of the verb "like".
The phrase "that stuff" is a noun phrase and the direct object of the verb "like".
The word "like" is a present tense verb.
The word "like" is the main verb of "some people like that stuff".
The word "Ø" is an abstract empty determiner specifying the noun "people".
The word "people" is a plural count noun.
The word "people" is the head of the noun phrase "some people".
The word "some" is a quantifier specifying the noun "people".
The word "stuff" is a singular mass noun.
The word "stuff" is the head of the noun phrase "that stuff".
The word "that" is a determiner specifying the noun "stuff".

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(104) some like that

The clause "some like that" is a statement.
The phrase "that" is a noun phrase and the direct object of the verb "like".
The phrase "some" is a noun phrase and the subject of the verb "like".
The word "like" is the main verb of "some like that".
The word "like" is a present tense verb.
The word "Ø" is an abstract empty determiner specifying the noun "[u]".
The word "some" is a quantifier specifying the noun "[u]".
The word "that" is a determiner specifying the noun "[u]".
The word "[u]" is the abstract empty head of the noun phrase "some".
The word "[u]" is the abstract empty subject of the verb "like".
The word "[u]" is the abstract empty head of the noun phrase "that".
(105) those six hungry men ate everything

The clause "those six hungry men ate everything" is a statement.
The phrase "those six hungry men" is a noun phrase and the subject of the verb "ate".
The word "ate" is the main verb of "those six hungry men ate everything".
The word "men" is a plural count noun.
The word "hungry" is an adjective modifying the noun "men".
The word "six" is a numeral modifying the noun "men".

(106) many of those thirty five children are absent

The clause "many of those thirty five children are absent" is a statement.
The phrase "of those thirty five children" is a prepositional phrase and modifier of the noun "[u]".
The word "of" is a preposition introducing the prepositional phrase "of those thirty five children".
The word "thirty" is a numeral modifying the noun "children".
The word "children" is a plural count noun.
The word "many" is a quantifier specifying the noun "[u]".
The word "Ø" is an abstract empty determiner specifying the noun "[u]".
The word "[u]" is the abstract empty subject of the verb "are".
The word "[u]" is the abstract empty head of the noun phrase "many of those thirty five children".
(107) all those people have choices

The clause "all those people have choices" is a statement.
The phrase "all those people" is a noun phrase and the subject of the verb "have".
The phrase "choices" is a noun phrase and the direct object of the verb "have".
The word "all" is a quantifier specifying the noun "people".
The word "choices" is the head of the noun phrase "choices".
The word "choices" is a plural count noun.
The word "have" is a present tense verb.
The word "have" is the main verb of "all those people have choices".
The word "Ø" is an abstract empty determiner specifying the noun "choices".
The word "people" is a plural count noun.
The word "people" is the head of the noun phrase "all those people".
The word "those" is a determiner specifying the noun "people".

(108) my sister's husband is ill

The clause "my sister's husband is ill" is a statement.
The phrase "ill" is a predicate adjective referring back to the subject "husband".
The phrase "my sister's husband" is a noun phrase and the subject of the verb "is".
The phrase "my" is a possessive phrase specifying "sister".
The word "husband" is a singular count noun.
The word "husband" is the head of the noun phrase "my sister's husband".
The word "ill" is an adjective.
The word "is" is a third person singular present tense verb.
The word "is" is the main verb of "my sister's husband is ill".
The word "my" is a first person singular possessive pronoun.
The word "POS" is a determiner specifying the noun "husband".
The word "POS" is a determiner specifying the noun "sister".
The word "sister" is a singular count noun.
The word "sister" is the head of the noun phrase "my sister".
my POS

(109) all the men’s money is secure

The clause "all the men’s money is secure" is a statement.
The phrase "all the men’s money" is a noun phrase and the subject of the verb "is".
The phrase "secure" is a predicate adjective referring back to the subject "money".
The word "all" is a quantifier specifying the noun "money".
The word "is" is the main verb of "all the men’s money is secure".
The word "POS" is a determiner specifying the noun "money".
The word "secure" is an adjective.
The word "the" is a determiner specifying the noun "men".

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SAMPLE PARSES ILLUSTRATING QUANTIFIERS AND COMPARATIVES

(110) they eat too much bread

The clause "they eat too much bread" is a statement.
The phrase "they" is a noun phrase and the subject of the verb "eat".
The phrase "too much bread" is a noun phrase and the direct object of the verb "eat".
The word "bread" is a singular mass noun.
The word "eat" is the head of the noun phrase "too much bread".
The word "they" is the main verb of "they eat too much bread".
The word "much" is a quantifier specifying the noun "bread".
The word "Ø" is an abstract empty determiner specifying the noun "bread".
The word "they" is a third person plural subject pronoun.
The word "too" is a degree word specifying the quantifier "much".

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| NOUN2C  | TNS     | VERB1 |
| they    | PRS     | eat |
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(111) they eat so much more bread than us

The clause "they eat so much more bread than us" is a statement.
The phrase "so much more bread than us" is a noun phrase and the direct object of the verb "eat".
The phrase "they" is a noun phrase and the subject of the verb "eat".
The phrase "us" is a noun phrase and the object of the preposition "than".
The word "bread" is a singular mass noun.
The word "bread" is the head of the noun phrase "so much more bread than us".
The word "eat" is a present tense verb.
The word "eat" is the main verb of "they eat so much more bread than us".
The word "more" is a quantifier specifying the noun "bread".
The word "much" is a quantifier specifying the quantifier "more".
The word "Ø" is an abstract empty determiner specifying the noun "bread".
The word "so" is a degree word specifying the quantifier "much".
The word "than" is a preposition introducing the prepositional phrase "than us".
The word "they" is a third person plural subject pronoun.
The word "us" is a first person plural object pronoun.

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</table>
(112) they seemed so content
The clause "they seemed so content" is a statement.
The phrase "so content" is a predicate adjective referring back to the subject "they".
The phrase "they" is a noun phrase and the subject of the verb "seemed".
The word "content" is an adjective modifying the subject "they".
The word "seemed" is a past tense verb.
The word "so" is a degree word specifying the quantifier "[much]".
The word "they" is a third person plural subject pronoun.
The word "[much]" is an abstract quantifier specifying the adjective "content".

(113) they seemed so much more content than us
The clause "they seemed so much more content than us" is a statement.
The phrase "so much more content than us" is an adjective phrase describing the subject "they".
The phrase "they" is a noun phrase and the subject of the verb "seemed".
The phrase "us" is a noun phrase and the object of the preposition "than".
The word "content" is an adjective.
The word "more" is a quantifier specifying the adjective "content".
The word "much" is a quantifier specifying the quantifier "more".
The word "seemed" is a past tense verb.
The word "so" is a degree word specifying the quantifier "much".
The word "than" is a preposition introducing the prepositional phrase "than us".
The word "they" is a third person plural subject pronoun.
The word "us" is a first person plural object pronoun.
(114) they eat more bread than we eat

The clause "they eat more bread than we eat" is a statement.
The clause "we eat" is a statement.
The phrase "more bread than we eat" is a noun phrase and the direct object of the verb "eat".
The phrase "they" is a noun phrase and the subject of the verb "eat".
The phrase "we" is a noun phrase and the subject of the verb "eat".
The phrase "[u]" is an abstract empty noun phrase and the direct object of the verb "eat".
The word "bread" is the head of the noun phrase "more bread than we eat".
The word "bread" is a singular mass noun.
The word "eat" is a present tense verb.
The word "eat" is the main verb of "they eat more bread than we eat".
The word "eat" is the main verb of "we eat".
The word "eat" is a present tense verb.
The word "more" is a quantifier specifying the noun "bread".
The word "[Ø]" is an abstract empty determiner specifying the noun "bread".
The word "than" is a subordinating conjunction introducing the clause "we eat".
The word "they" is a third person plural subject pronoun.
The word "we" is a first person plural subject pronoun.
(115) they eat as much rice as we eat

The clause "they eat as much rice as we eat" is a statement.
The clause "we eat" is a statement.
The phrase "as much rice as we eat" is a noun phrase and the direct object of the verb "eat".
The phrase "they" is a noun phrase and the subject of the verb "eat".
The phrase "we" is a noun phrase and the subject of the verb "eat".
The word "as" is a subordinating conjunction.
The word "as" is a degree word specifying the quantifier "much".
The word "eat" is a present tense verb.
The word "eat" is the main verb of "they eat as much rice as we eat".
The word "eat" is the main verb of "we eat".
The word "much" is a quantifier specifying the noun "rice".
The word "Ø" is an abstract empty determiner specifying the noun "rice".
The word "rice" is a singular mass noun.
The word "rice" is the head of the noun phrase "as much rice as we eat".
The word "they" is a third person plural subject pronoun.
The word "we" is a first person plural subject pronoun.
SAMPLE PARSES ILLUSTRATING AN EMPTY MAIN VERB "BE"

(116) they are so happy

The clause "they are so happy" is a statement.
The phrase "so happy" is a predicate adjective referring back to subject "they".
The phrase "they" is a noun phrase and the subject of the verb "are".
The word "are" is a third person plural present tense verb.
The word "are" is the main verb of "they are so happy".
The word "happy" is an adjective.
The word "so" is a degree word specifying the quantifier "[much]".
The word "they" is a third person plural subject pronoun.
The word "[much]" is an abstract quantifier specifying the adjective "happy".

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N3 C3 V2

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NOM2C TNS VERB10

they PRS are

|--------|
| | ADJ1
| happy

C3 N0

NEMPQNT

[much]

C0

DGR

so

The clause "they are so happy" is a statement.
The phrase "happy" is a predicate adjective referring back to subject "they".
The phrase "they" is a noun phrase and the subject of the verb "are".
The word "are" is a third person plural present tense verb.
The word "are" is the main verb of "they are so happy".
The word "happy" is an adjective.
The word "so" is an emphatic specifying the auxiliary "are".
The word "they" is a third person plural subject pronoun.
The word "[e]" is the abstract empty main verb of "they are so happy".

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| N0 C0 C3 V0, C3

NOM2C [e]

they PRS are

| V3 C0 C0 C0
| TNS EMP ADJ1
| PRS so happy

V0, AUXB10

are
(117) they are so much happier

The clause "they are so much happier" is a statement.
The phrase "so much happier" is an adjective phrase describing the subject "they".
The phrase "they" is a noun phrase and the subject of the verb "are".
The word "are" is a third person plural present tense verb.
The word "are" is the main verb of "they are so much happier".
The word "happier" is a comparative adjective.
The word "much" is a quantifier specifying the adjective "happier." The word "so" is a degree word specifying the quantifier "much".
The word "they" is a third person plural subject pronoun.

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NOM2C TNS VERB10 |---------|
they   PRS       are       |          |
|        |          |          |
|        |          |          |
| N3     C0       |
|--------| ADJ2     | happier |
|        | C3       | N0      |
|        | QNTDGR   | much    |
|        | C0       | DGR     |
so

The clause "they are so much happier" is a statement.
The phrase "much happier" is an adjective phrase describing the subject "they".
The phrase "they" is a noun phrase and the subject of the verb "are".
The word "are" is a third person plural present tense verb.
The word "are" is the main verb of "they are so much happier".
The word "happier" is a comparative adjective.
The word "much" is a quantifier specifying the adjective "happier." The word "so" is an emphatic specifying the auxiliary "are".
The word "they" is a third person plural subject pronoun.
The word "[e]" is the abstract empty main verb of "they are so much happier".

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NOM2C |---------| EVERB |---------|
they   |          | [e]   |          |
|        |          |        |          |
|        |          |        |          |
| V3     C0       C0       N3     C0 |
| TNS    EMP   | ADJ2     |
| FRS    so     | happier   |
|        |          |          |
| V0i     |
AUXB10 | QNTDGR     |
are    much
they are all ready

The clause "they are all ready" is a statement.
The phrase "all ready" is a predicate adjective referring back to the subject "they".
The phrase "they" is a noun phrase and the subject of the verb "are".
The word "all" is a quantifier specifying the adjective "ready".
The word "are" is a third person plural present tense verb.
The word "are" is the main verb of "they are all ready".
The word "ready" is an adjective.
The word "ready" is the head of the adjective phrase "all ready".
The word "they" is a third person plural subject pronoun.

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V3 |
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    | N0 C0 V0 C3 |
NOM2C TNS VERB10 |
    |--------|
    |  |  |  |
    | they FRS are |
    |  |  |  |  |  |
    | N3 C0 |
    |  | ADJ1 |
    |  | ready |
    | N0 |
QNTNOM all
```

The clause "they are all ready" is a statement.
The phrase "ready" is a predicate adjective referring back to the subject "they".
The phrase "they" is a noun phrase and the subject of the verb "are".
The word "all" is a floating quantifier specifying the subject "they".
The word "are" is a third person plural present tense verb.
The word "are" is the main verb of "they are all ready".
The word "ready" is an adjective.
The word "they" is a third person plural subject pronoun.
The word "[e]" is the abstract empty main verb of "they are all ready".

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V3 |
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    | N0 C0 N3 V0_i C3 |
NOM2C |
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    |  |  |  |
    | they |
    |  |  |  |  |  |
    | V3 C0 N0 C0 |
    |  | TNS QNTNLT ADJ1 |
    |  | FRS all ready |
    |  | V0_i |
    | AUXB10 |
are
```
(119) they are both ready and willing

The clause "they are both ready and willing" is a statement.
The phrase "both ready and willing" is a predicate adjective referring back to the subject "they".
The phrase "they" is a noun phrase and the subject of the verb "are".
The word "are" is the main verb of "they are both ready and willing".
The word "both" is a floating quantifier specifying the subject "they".
The word "ready" is an adjective modifying the subject "they".
The word "willing" is an adjective modifying the subject "they".
SAMPLE PARSES ILLUSTRATING ADJECTIVAL (RELATIVE) CLAUSES

(120) the man who she admired died

The clause "the man who she admired died" is a statement.
The clause "who she admired" is an appositive relative clause modifying the noun "man".
The phrase "she" is a noun phrase and the subject of the verb "admired".
The phrase "the man who she admired" is a noun phrase and the subject of the verb "died".
The phrase "[e]" is an abstract empty noun phrase and the direct object of the verb "admired".
The word "admired" is a past tense verb.
The word "admired" is the main verb of "who she admired".
The word "died" is a past tense verb.
The word "died" is the main verb of "the man who she admired died".
The word "man" is the head of the noun phrase "the man who she admired".
The word "she" is a third person singular feminine subject pronoun.
The word "the" is a determiner specifying the noun "man".
The word "who" is a relative pronoun.
(121) the man that she admired died

The clause "that she admired" is a restrictive relative clause modifying the noun "man".
The clause "the man that she admired died" is a statement.
The phrase "the man that she admired" is a noun phrase and the subject of the verb "admired".
The phrase "the man that she admired died" is a statement.
The word "that" is a complementizer specifying the clause "she admired [e]".
The word "the" is a determiner specifying the noun "man".

(122) the man she admired died

The clause "she admired" is a restrictive relative clause modifying the noun "man".
The clause "the man she admired died" is a statement.
The phrase "she" is a noun phrase and the subject of the verb "admired".
The phrase "the man she admired" is a noun phrase and the subject of the verb "died".
The word "she" is a third person singular feminine subject pronoun.
The word "the" is a determiner specifying the noun "man".
The clause "the man who admired her died" is a statement.
The phrase "who admired her" is an appositive relative clause modifying the noun "man".
The phrase "her" is a noun phrase and the direct object of the verb "admired".
The word "admired" is a past tense verb.
The word "died" is the main verb of "the man who admired her died".
The word "died" is a past tense verb.
The word "her" is a third person singular feminine object pronoun.
The word "man" is the head of the noun phrase "the man who admired her".
The word "the" is a determiner specifying the noun "man".
The word "who" is a relative pronoun.
(124) the man that admired her died

The clause "that admired her" is a restrictive relative clause modifying the noun "man".
The clause "the man that admired her died" is a statement.
The phrase "her" is a noun phrase and the direct object of the verb "admired".
The phrase "the man who admired her" is a noun phrase and the subject of the verb "died".
The phrase "[e]" is an abstract empty noun phrase and the subject of the verb "admired".
The phrase "[e]" is an abstract empty relative pronoun.
The word "admired" is a past tense verb.
The word "admired" is the main verb of "that admired her".
The word "died" is the main verb of "the man who admired her died".
The word "died" is a past tense verb.
The word "her" is a third person singular feminine object pronoun.
The word "man" is the head of the noun phrase "the man that admired her".
The word "that" is a complementizer specifying the clause "[e] admired her".
The word "the" is a determiner specifying the noun "man".
The clause "teachers praise" is a restrictive relative clause modifying the noun "student".

The clause "teachers praise" is a statement.

The clause "the student teachers praise progress" is a statement.

The phrase "teachers" is a noun phrase and the subject of the verb "praise".

The phrase "the student teachers praise" is a noun phrase and the subject of the verb "progress".

The phrase "[e]" is an abstract empty noun phrase and the direct object of the verb "praise".

The phrase "Ø" is an abstract empty relative pronoun.

The word "Ø" is an abstract empty determiner specifying the noun "teachers".

The word "Ø" is an abstract empty complementizer specifying the clause "teachers praise [e]".

The word "praise" is the main verb of "teachers praise".

The word "praise" is a present tense verb.

The word "progress" is the main verb of "the student teachers praise progress".

The word "progress" is a present tense verb.

The word "student" is a singular count noun.

The word "student" is the head of the noun phrase "the student teachers praise".

The word "teachers" is the head of the noun phrase "teachers".

The word "teachers" is a plural count noun.

The word "the" is a determiner specifying the noun "student".

The clause "the student teachers praise progress" is a statement.

The phrase "progress" is a noun phrase and the direct object of the verb "praise".

The word "Ø" is an abstract empty determiner specifying the noun "progress".

The word "praise" is a present tense verb.

The word "progress" is the head of the noun phrase "the student teachers praise progress".

The word "progress" is a singular mass noun.

The word "progress" is the head of the noun phrase "student".

The word "student" is a singular count noun.

The word "student" is the head of the noun phrase "student teachers".

The word "teachers" is a plural count noun.

The word "teachers" is the head of the noun phrase "the student teachers".

The word "the" is a determiner specifying the noun "teachers".
(127) the student teachers praise progresses

The clause "teachers praise" is a restrictive relative clause modifying the noun "student". The clause "teachers praise" is a statement. The clause "the student teachers praise progresses" is a statement. The phrase "[e]" is an abstract empty noun phrase and the direct object of the verb "praise". The phrase "[e]" is an abstract empty relative pronoun. The phrase "teachers" is a noun phrase and the subject of the verb "praise". The phrase "the student teachers praise" is a noun phrase and the subject of the verb "progresses". The word "Ø" is an abstract empty determiner specifying the noun "teachers". The word "Ø" is an abstract empty complementizer specifying the clause "teachers praise [e]". The word "praise" is the main verb of "teachers praise". The word "praise" is a present tense verb. The word "progresses" is the main verb of "the student teachers praise progresses". The word "progresses" is a third person singular present tense verb. The word "student" is a singular count noun. The word "student" is the head of the noun phrase "the student teachers praise". The word "teachers" is the head of the noun phrase "teachers". The word "teachers" is a plural count noun. The word "the" is a determiner specifying the noun "student".

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The clause "the student teachers praise progresses" is a statement. The phrase "progresses" is a noun phrase and the direct object of the verb "praise". The phrase "the student teachers" is a noun phrase and the subject of the verb "praise". The word "Ø" is an abstract empty determiner specifying the noun "progresses". The word "praise" is the main verb of "the student teachers praise progresses". The word "praise" is a present tense verb. The word "progresses" is a plural count noun. The word "progresses" is the head of the noun phrase "progresses". The word "student" is the head of the noun phrase "student". The word "student" is a singular count noun. The word "teachers" is a plural count noun. The word "teachers" is the head of the noun phrase "the student teachers". The word "the" is a determiner specifying the noun "teachers".

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SAMPLE PARSES ILLUSTRATING OBJECT COMPLEMENT CLAUSES

(128) lucy thinks that ethel went

The clause "lucy thinks that ethel went" is a statement.
The clause "that ethel went" is a complement clause of the verb "thinks".
The clause "ethel went" is an indirect statement.
The phrase "ethel" is a noun phrase and the subject of the verb "went".
The phrase "lucy" is a noun phrase and the subject of the verb "thinks".
The word "ethel" is a proper noun.
The word "lucy" is a proper noun.
The word "that" is a complementizer specifying the complement clause "ethel went".
The word "thinks" is the main verb of "lucy thinks that ethel went".
The word "ethel" is a proper noun.
The word "went" is a past tense verb.
The word "went" is the main verb of "that ethel went".

(129) lucy thinks ethel went

The clause "ethel went" is an indirect statement.
The clause "lucy thinks ethel went" is a statement.
The clause "ethel went" is a complement clause of the verb "thinks".
The phrase "ethel" is a noun phrase and the subject of the verb "went".
The phrase "lucy" is a noun phrase and the subject of the verb "thinks".
The word "ethel" is a proper noun.
The word "lucy" is a proper noun.
The word "Ø" is a complementizer specifying the complement clause "ethel went".
The word "thinks" is the main verb of "lucy thinks ethel went".
The word "thinks" is the main verb of "ethel went".
The word "went" is a past tense verb.
The word "went" is the main verb of "ethel went".
SAMPLE PARSES ILLUSTRATING SUBJECT COMPLEMENT CLAUSES

(130) it amazes me that she went

The clause "it amazes me that she went" is a statement.
The clause "that she went" is an extraposed subject complement.
The phrase "it" is a noun phrase and the subject of the verb "amazes".
The phrase "me" is a noun phrase and the direct object of the verb "amazes".
The phrase "she" is a noun phrase and the subject of the verb "went".
The word "amazes" is the main verb of "it amazes me that she went".
The word "amazes" is a third person singular present tense verb.
The word "it" is an expletive referring forward to the clause "that she went".
The word "she" is a third person singular feminine subject pronoun.
The word "me" is a first person singular object pronoun.
The word "that" is a complementizer specifying the complement clause "she went".
The word "went" is a past tense verb.
The word "went" is the main verb of "that she went".

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it      PRS      amazes      |        that       |        went
N0                  N0        C0
ACC                NOM1C     TNS
me                  she      PST

(131) that she went amazes me

The clause "that she went amazes me" is a statement.
The clause "that she went" is a subject complement.
The phrase "me" is a noun phrase and the direct object of the verb "amazes".
The phrase "she" is a noun phrase and the subject of the verb "went".
The phrase "[it] that she went" is a noun phrase and the subject of the verb "amazes".
The word "amazes" is the main verb of "that she went amazes me".
The word "amazes" is a third person singular present tense verb.
The word "me" is a first person singular object pronoun.
The word "she" is a third person singular feminine subject pronoun.
The word "that" is a complementizer specifying the complement clause "she went".
The word "went" is a past tense verb.
The word "went" is the main verb of "that she went".
The word "[it]" is an abstract empty expletive.

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C3                me

C3                V3
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CPL       |        VERB3
that       |        went
N0        C0
NOM1C     TNS
she      PST
SAMPLE PARSES ILLUSTRATING EXPLETIVES

(132) there is a unicorn in the garden

The clause "there is a unicorn in the garden" is a statement.
The phrase "in the garden" is a prepositional phrase and a modifier of the verb "is".
The phrase "the garden" is a noun phrase and the object of the preposition "in".
The phrase "there" is a noun phrase and the subject of the verb "is".
The word "a" is a determiner specifying the noun "unicorn".
The word "garden" is the head of the noun phrase "the garden".
The word "a" is a singular count noun.
The word "in" is a preposition introducing the prepositional phrase "in the garden".
The word "is" is a third person singular present tense verb.
The word "there" is the main verb of "there is a unicorn in the garden".
The word "the" is a determiner specifying the noun "garden".
The word "there" is an expletive referring forward to the noun phrase "a unicorn".
The word "unicorn" is the head of the noun phrase "a unicorn".
The word "unicorn" is a singular count noun.

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EXP       TNS       VERB2      |---------|
n there   PRS       is        |         |
|         |         |         |
C3        N0        C1
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NOUN1     |---------|
|         |         |
C0        C0        N3
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DET1A     PRP       |---------|
a        in        |         |
|         |         |
C3        N0
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NOUN3A    |---------|
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C0        DET3      the

(133) a unicorn is in the garden

The clause "a unicorn is in the garden" is a statement.
The phrase "a unicorn" is a noun phrase and the subject of the verb "is".
The phrase "in the garden" is a prepositional phrase and a modifier of the verb "is".
The phrase "the garden" is a noun phrase and the object of the preposition "in".
The word "a" is a determiner specifying the noun "unicorn".
The word "garden" is the head of the noun phrase "the garden".
The word "a" is a singular count noun.
The word "in" is a preposition introducing the prepositional phrase "in the garden".
The word "is" is the main verb of "a unicorn is in the garden".
The word "is" is a third person singular present tense verb.
The word "the" is a determiner specifying the noun "garden".
The word "unicorn" is a singular count noun.
The word "unicorn" is the head of the noun phrase "a unicorn".

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DET1A     PRP       |---------|
a        in        |         |
|         |         |
C3        N0
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NOUN3A    |---------|
|         |         |
C0        DET3      the
(134) it is clear that she is happy

The clause "it is clear that she is happy" is a statement.
The clause "that she is happy" is an extraposed subject complement.
The phrase "clear" is a predicate adjective referring back to the subject "it".
The phrase "happy" is a predicate adjective referring back to the subject "she".
The phrase "it" is a noun phrase and the subject of the verb "is".
The phrase "she" is a noun phrase and the subject of the verb "is".
The word "clear" is an adjective.
The word "happy" is an adjective.
The word "is" is a third person singular present tense verb.
The word "is" is the main verb of "it is clear that she is happy".
The word "is" is the main verb of "that she is happy".
The word "it" is an expletive referring forward to the clause "that she is happy".
The word "she" is a third person singular feminine subject pronoun.
The word "that" is a complementizer specifying the complement clause "she is happy".

(135) that she is happy is clear

The clause "that she is happy is clear" is a statement.
The phrase "clear" is a predicate adjective referring back to the subject "[it]".
The phrase "happy" is a predicate adjective referring back to the subject "she".
The phrase "[it]" that she is happy" is a noun phrase and the subject of the verb "is".
The word "[it]" is an abstract empty word standing for the expletive "it".
The word "clear" is an adjective.
The word "happy" is an adjective.
The word "is" is a third person singular present tense verb.
The word "is" is the main verb of "that she is happy is clear".
The word "is" is the main verb of "that she is happy".
The word "is" is a third person singular present tense verb.
The word "she" is a third person singular feminine subject pronoun.
The word "that" is a complementizer specifying the complement clause "she is happy".
The clause "if lucy goes" is an adverbial subordinate clause modifying the clause "ethel should go".
The clause "if lucy goes ethel should go" is a statement.
The clause "lucy goes" is a statement.
The phrase "ethel" is a noun phrase and the subject of the verb "go".
The phrase "lucy" is a noun phrase and the subject of the verb "goes".
The word "ethel" is a proper noun.
The word "go" is the main verb of "if lucy goes ethel should go".
The word "goes" is the main verb of "lucy goes".
The word "goes" is a third person singular present tense verb.
The word "if" is a subordinating conjunction.
The word "lucy" is a proper noun.
The word "should" is a modal auxiliary specifying the meaning of the verb "go".

if lucy goes ethel should go

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|---------|---------|       ethel      |---------|
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|---------|---------|       NOUN4A      |---------|
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|         |         |                   |         |
|---------|---------|       lucy        |---------|
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(137) ethel should go if lucy goes

The clause "ethel should go if lucy goes" is a statement.
The clause "if lucy goes" is an adverbial subordinate clause modifying the clause "ethel should go".
The clause "lucy goes" is a statement.
The phrase "ethel" is a noun phrase and the subject of the verb "go".
The phrase "lucy" is a noun phrase and the subject of the verb "goes".
The word "ethel" is a proper noun.
The word "go" is the main verb of "ethel should go if lucy goes".
The word "goes" is a third person singular present tense verb.
The word "if" is a subordinating conjunction.
The word "lucy" is a proper noun.
The word "should" is a modal auxiliary specifying the meaning of the verb "go".
since the weather was nice we went for a drive

The clause "since the weather was nice we went for a drive" is a statement.
The clause "the weather was nice" is a statement.
The phrase "a drive" is a noun phrase and the object of the preposition "for".
The phrase "for a drive" is a prepositional phrase and a modifier of the verb "went".
The phrase "nice" is a predicate adjective referring back to the subject "weather".
The phrase "the weather" is a noun phrase and the subject of the verb "was".
The phrase "we" is a noun phrase and the subject of the verb "went".
The word "a" is a determiner specifying the noun "drive".
The word "drive" is a singular mass noun.
The word "drive" is the head of the noun phrase "a drive".
The word "for" is a preposition introducing the prepositional phrase "for a drive".
The word "nice" is an adjective.
The word "since" is a subordinating conjunction.
The word "the" is a determiner specifying the noun "weather".
The word "was" is a past tense verb.
The word "we" is a first person plural subject pronoun.
The word "weather" is a singular mass noun.
The word "weather" is the head of the noun phrase "the weather".
The word "went" is a past tense verb.
The word "went" is the main verb of "since the weather was nice we went for a drive".
The clause "the weather was nice" is a statement.
The clause "we went for a drive since the weather was nice" is a statement.
The phrase "a drive" is a noun phrase and the object of the preposition "for".
The phrase "for a drive" is a prepositional phrase and a modifier of the verb "went".
The phrase "nice" is a predicate adjective referring back to the subject "weather".
The phrase "the weather" is a noun phrase and the subject of the verb "was".
The phrase "we" is a noun phrase and the subject of the verb "went".
The word "a" is a determiner specifying the noun "drive".
The word "drive" is a singular mass noun.
The word "drive" is the head of the noun phrase "a drive".
The word "for" is a preposition introducing the prepositional phrase "for a drive".
The word "nice" is an adjective.
The word "since" is a subordinating conjunction.
The word "the" is a determiner specifying the noun "weather".
The word "was" is a past tense verb.
The word "was" is the main verb of "the weather was nice".
The word "we" is a first person plural subject pronoun.
The word "weather" is a singular mass noun.
The word "weather" is the head of the noun phrase "the weather".
The word "went" is a past tense verb.
The word "went" is the main verb of "we went for a drive since the weather was nice".

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SAMPLE PARSES ILLUSTRATING GERUNDS

(140) swimming in that lake is dangerous

The clause "swimming in that lake is dangerous" is a statement.
The phrase "dangerous" is a predicate adjective referring back to the subject "swimming in that lake".
The phrase "in that lake" is a prepositional phrase and a modifier of the verb "swimming".
The phrase "that lake" is a noun phrase and the subject of the preposition "in".
The phrase "dangerous" is an adjective.
The word "in" is a preposition introducing the prepositional phrase "in that lake".
The word "is" is a third person singular present tense verb.
The word "lake" is a singular count noun.
The word "swimming" is gerund.
The word "that" is a determiner specifying the noun "lake".
The word "[-ing]" is the abstract marker for the gerund.

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(141) i like playing the tuba

The clause "i like playing the tuba" is a statement.
The phrase "i" is a noun phrase and the subject of the verb "like".
The phrase "playing the tuba" is a noun phrase and the direct object of the verb "like".
The phrase "the tuba" is a noun phrase and the direct object of the verb "playing".
The verb "like" is a present tense verb.
The word "i" is a first person singular subject pronoun.
The word "like" is the main verb of "i like playing the tuba".
The word "playing" is a gerund.
The word "the" is a determiner specifying the noun "tuba".
The word "tuba" is a singular count noun.
The word "tuba" is the head of the noun phrase "the tuba".
The word "[-ing]" is the abstract marker for the gerund.
SAMPLE PARSES ILLUSTRATING INFINITIVE PHRASES

(142) i want to go

The clause "i want to go" is a statement.
The phrase "i" is a noun phrase and the subject of the verb "want".
The phrase "to go" is an infinitive complement of the verb "want".
The word "go" is an infinitive form of the verb.
The word "i" is a first person singular subject pronoun.
The word "to" is the marker for the infinitive.
The word "want" is a present tense verb.
The word "want" is the main verb of "i want to go".

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N3        C3        V1
|         |         |---------|
|         |         |         |
|         |         |         |
N0        C0        V0        C3
NOM1A     TNS       VERB1      |
i       PRS       want       |
|         |         |
C1        |---------|
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C0        V3
INF       |
to        |
|         |
V0        VBARE
VBARE
go

(143) i want him to go

The clause "i want him to go" is a statement.
The phrase "him" is a noun phrase and subject of the infinitive verb "go".
The phrase "him" is a noun phrase and the direct object of the verb "want".
The phrase "i" is a noun phrase and the subject of the verb "want".
The phrase "to go" is an infinitive complement of the verb "want".
The word "go" is an infinitive form of the verb.
The word "him" is a third person singular masculine object pronoun.
The word "i" is a first person singular subject pronoun.
The word "to" is the marker for the infinitive.
The word "want" is a present tense verb.
The word "want" is the main verb of "i want him to go".

V3
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N3        C3        V1
|         |         |---------|
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|         |         |         |
N0        C0        V0        N3        C3
NOM1A     TNS       VERB1      |
i       PRS       want       |
|         |         |         |
N0        C1        ACC
him       |---------|
|         |
|         |
C0        V3
INF       |
to        |
|         |
V0        VBARE
VBARE
go
(144) the girls will all want to dress themselves

The clause "the girls will all want to dress themselves" is a statement.
The phrase "the girls" is a noun phrase and the subject of the verb "want".
The phrase "themselves" is a noun phrase and the direct object of the verb "dress".
The phrase "to dress themselves" is an infinitive complement of the verb "want".
The word "all" is a floating quantifier specifying the noun "girls".
The word "dress" is an infinitive form of the verb.
The word "girls" is a plural count noun.
The word "the" is a determiner specifying the noun "girls".
The word "themselves" is a reflexive pronoun.
The word "to" is the marker for the infinitive.
The word "want" is the main verb of "the girls will all want to dress themselves".
The word "will" is a modal auxiliary specifying the meaning of the verb "want".
(145) the girls will all want the boys to dress themselves

The clause "the girls will all want the boys to dress themselves" is a statement.
The phrase "the boys" is a noun phrase and the direct object of the verb "want".
The phrase "the boys" is a noun phrase and the subject of the infinitive verb "dress".
The phrase "the girls" is a noun phrase and the subject of the verb "want".
The phrase "themselves" is a noun phrase and the direct object of the verb "dress".
The word "all" is a floating quantifier specifying the noun "girls".
The word "boys" is a plural count noun.
The word "boys" is the head of the noun phrase "the boys".
The word "dress" is an infinitive form of the verb.
The word "girls" is a plural count noun.
The word "girls" is the head of the noun phrase "the girls".
The word "the" is a determiner specifying the noun "girls".
The word "the" is a determiner specifying the noun "boys".
The word "themselves" is a reflexive pronoun.
The word "to" is the marker for the infinitive.
The word "want" is the main verb of "the girls will all want the boys to dress themselves".
The word "will" is a modal auxiliary specifying the meaning of the verb "want".
The clause "the girls will want all the boys to dress themselves" is a statement.
The phrase "all the boys" is a noun phrase and the direct object of the verb "want".
The phrase "to dress themselves" is an infinitive complement of the verb "want".
The word "all" is a floating quantifier specifying the noun "boys".
The word "boys" is a plural count noun.
The word "girls" is the head of the noun phrase "all the boys".
The word "dress" is an infinitive form of the verb.
The word "the" is a determiner specifying the noun "girls".
The word "themselves" is a reflexive pronoun.
The word "to" is the marker for the infinitive.
The word "want" is the main verb of "the girls will want all the boys to dress themselves".
The word "will" is a modal auxiliary specifying the meaning of the verb "want".

V3
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| C3 C3 V1
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| N3 N3 C3 V0 C0 V3 N3 C1
| NOUN2 |-------| MVERB |-------| NOUN2 |-------| MVERB |-------| NOUN2 |-------|
| girls |       | want  |       | girls |       | want  |       | girls |       |
|       |       |       |       |       |       |       |       |       |       |
| DET3 | TNS | N3 C3 N3 C1
| the | PUT |       |       |       |       |       |       |       |
| V0 N0 C0 N0 C0 V3
| MODAL | QNTNOM | DET3 | NOUN2 | INF | will | all the boys to |       |
| V1
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(147) it is hard for the boys to dress themselves

The clause "it is hard for the boys to dress themselves" is a statement.
The phrase "hard" is a predicate adjective referring back to the subject "it".
The phrase "the boys" is a noun phrase and subject of the infinitive verb "dress".
The phrase "dress" is a noun phrase and the object of the preposition "for".
The phrase "themselves" is a noun phrase and the direct object of the verb "dress".
The word "boys" is a plural count noun.
The word "boys" is the head of the noun phrase "the boys".
The word "dress" is an infinitive form of the verb.
The word "for" is a preposition introducing the prepositional phrase "for the boys to dress themselves".
The word "hard" is an adjective.
The word "is" is a third person singular present tense verb.
The word "the" is an expletive referring forward to the phrase "for the boys to dress themselves".
The word "themselves" is a reflexive pronoun.
The word "to" is the marker for the infinitive.
(148) she wanted to give the present to him

The clause "she wanted to give the present to him" is a statement.
The phrase "him" is a noun phrase and the object of the preposition "to".
The phrase "she" is a noun phrase and the subject of the verb "wanted".
The phrase "the present" is a noun phrase and the direct object of the verb "give".
The phrase "to give the present to him" is an infinitive complement of the verb "wanted".
The phrase "to him" is a prepositional phrase and a complement of the verb "give".
The word "give" is the infinitive form of the verb.
The word "him" is a third person singular masculine object pronoun.
The word "present" is a singular count noun.
The word "the" is a determiner specifying the noun "present".
The word "to" is a preposition introducing the prepositional phrase "to him".
The word "to" is the marker for the infinitive.
The word "wanted" is a past tense verb.
The word "wanted" is the main verb of "she wanted to give the present to him".
(149) those old men and young women arrived

The clause "those old men and young women arrived" is a statement.
The phrase "those old men and young women" is a noun phrase and the subject of the verb "arrived".
The word "and" is a coordinating conjunction.
The word "arrived" is a past tense verb.
The word "arrived" is the main verb of "those old men and young women arrived".
The word "men" is a plural count noun.
The word "men" is the head of the noun phrase "those old men and young women".
The word "old" is an adjective modifying the noun "men".
The word "those" is a determiner specifying the noun "men".
The word "women" is a plural count noun.
The word "women" is the head of the noun phrase "young women".
The word "young" is an adjective modifying the noun "women".
The word "[e]" is an abstract empty determiner specifying the noun "women".
(150) the old men and women arrived

The clause "the old men and women arrived" is a statement.
The phrase "the old men and women" is a noun phrase and the subject of the verb "arrived".
The word "and" is a coordinating conjunction.
The word "arrived" is a past tense verb.
The word "arrived" is the main verb of "the old men and women arrived".
The word "men" is a plural count noun.
The word "men" is the head of the noun phrase "the old men and women".
The word "old" is an adjective modifying the noun "men" and the noun "women".
The word "the" is a determiner specifying the noun "men".
The word "women" is a plural count noun.
The word "women" is the head of the noun phrase "women".
The word "[e]" is an abstract empty determiner specifying the noun "women".
both lucy and ethel went

The clause "both lucy and ethel went" is a statement.
The phrase "both lucy and ethel" is a noun phrase and the subject of the verb "went".
The word "and" is a coordinating conjunction.
The word "both" is a correlative quantifier.
The word "lucy" is a proper noun.
The word "went" is a past tense verb.
The word "went" is the main verb of "both lucy and ethel went".

eight hundred and fifty four students went

The clause "eight hundred and fifty four students went" is a statement.
The phrase "eight hundred and fifty four students" is a noun phrase and the subject of the verb "went".
The word "and" is a coordinating conjunction.
The word "eight" is a numeral.
The word "fifty" is a numeral.
The word "four" is a numeral.
The word "hundred" is a numeral.
The word "Ø" is an abstract empty determiner specifying the noun "students".
The word "students" is a plural count noun.
The word "students" is the head of the noun phrase "eight hundred and fifty four students".
The word "went" is a past tense verb.
The word "went" is the main verb of "eight hundred and fifty four students went".
The clause "she is happy and content" is a statement.
The phrase "happy and content" is a predicate adjective referring back to the subject "she".
The phrase "she" is a noun phrase and the subject of the verb "is".
The word "and" is a coordinating conjunction.
The word "content" is an adjective.
The word "happy" is an adjective.
The word "is" is a third person singular present tense verb.
The word "she" is the main verb of "she is happy and content".
The word "she" is a third person singular feminine subject pronoun.

The clause "she is both young and restless" is a statement.
The phrase "both young and restless" is a predicate adjective referring back to the subject "she".
The phrase "she" is a noun phrase and the subject of the verb "is".
The word "and" is a coordinating conjunction.
The word "both" is a correlative quantifier.
The word "is" is a third person singular present tense verb.
The word "is" is the main verb of "she is both young and restless".
The word "restless" is an adjective.
The word "she" is a third person singular feminine subject pronoun.
The word "young" is an adjective.
(155) she is very young and too restless

The clause "she is very young and too restless" is a statement.
The phrase "she" is a noun phrase and the subject of the verb "is".
The phrase "very young and too restless" is a predicate adjective referring back to the subject "she".
The word "and" is a coordinating conjunction.
The word "is" is a third person singular present tense verb.
The word "is" is the main verb of "she is very young and too restless".
The word "restless" is an adjective.
The word "she" is a third person singular feminine subject pronoun.
The word "too" is a degree word specifying the quantifier "[much]".
The word "very" is a degree word specifying the quantifier "[much]".
The word "young" is an adjective.

(156) she went quickly and quietly

The clause "she went quickly and quietly" is a statement.
The phrase "she" is a noun phrase and the subject of the verb "went".
The word "and" is a coordinating conjunction.
The word "quickly" is a manner adverb modifying the verb "went".
The word "quietly" is a manner adverb modifying the verb "went".
The word "she" is a third person singular feminine subject pronoun.
The word "went" is a past tense verb.
The word "went" is the main verb of "she went quickly and quietly".
quietly
(157) he washed the car with soap and water

The clause "he washed the car with soap and water" is a statement.
The phrase "he" is a noun phrase and the subject of the verb "washed".
The phrase "soap and water" is a noun phrase and the object of the preposition "with".
The phrase "the car" is a noun phrase and the direct object of the verb "washed".
The phrase "with soap and water" is a prepositional phrase and a modifier of the verb "washed".
The word "and" is a coordinating conjunction.
The word "car" is a singular count noun.
The word "car" is the head of the noun phrase "the car".
The word "he" is a third person singular masculine subject pronoun.
The word "Ø" is an abstract empty determiner specifying the noun "soap".
The word "soap" is a singular mass noun.
The word "soap" is the head of the noun phrase "soap and water".
The word "the" is a determiner specifying the noun "car".
The word "washed" is a past tense verb.
The word "washed" is the main verb of "he washed the car with soap and water".
The word "water" is a singular mass noun.
The word "water" is the head of the noun phrase "water".
The word "with" is a preposition introducing the prepositional phrase "with soap and water".
The word "Ø" is an abstract empty determiner specifying the noun "water".
(158) the boy and girl sang and their parents watched

The clause "the boy and girl sang and their parents watched" is a compound sentence.
The clause "the boy and girl sang" is a statement.
The clause "their parents watched" is a statement.
The phrase "their parents" is a noun phrase and the subject of the verb "watched".
The phrase "their" is a possessive phrase specifying "parents".
The word "and" is a coordinating conjunction.
The word "boy" is a singular count noun.
The word "boy" is the head of the noun phrase "the boy and girl".
The word "girl" is a singular count noun.
The word "girl" is the head of the noun phrase "girl".
The word "parents" is a plural count noun.
The word "parents" is the head of the noun phrase "their parents".
The word "POS" is a determiner specifying the noun "parents".
The word "sang" is the main verb of "the boy and girl sang".
The word "sang" is a past tense verb.
The word "the" is a determiner specifying the noun "boy and girl sang".
The word "their" is a third person plural possessive pronoun.
The word "watched" is a past tense verb.
The word "watched" is the main verb of "their parents watched".
The word "[e]" is an abstract empty determiner specifying the noun "girl".
361

(159) the boy and the girl sang and danced

The clause "the boy and the girl sang and danced" is a statement.
The phrase "the boy and the girl" is a noun phrase and the subject of the verb "sang".
The phrase "the" is a determiner specifying the noun "boy".
The word "sang" is a past tense verb.
The word "danced" is the main verb of "danced".
The word "girl" is a singular count noun.
The word "girl" is the head of the noun phrase "the girl".
The word "the" is a determiner specifying the noun "girl".
The word "the" is a determiner specifying the noun "boy".

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<td>TNS      VERB3</td>
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<td>boy      sang</td>
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<td>C3                                    N0      N3i    C3j  V0</td>
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<td>NOUN1    VERB3</td>
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<td>girl    danced</td>
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<td>DET3        NOUN1                      [e]    EMTNS</td>
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The clause "the soprano sang an aria and the tenor and the baritone sang a duet" is a compound sentence.

The clause "the soprano sang an aria" is a statement.

The clause "the tenor and the baritone sang a duet" is a statement.

The phrase "a duet" is a noun phrase and the direct object of the verb "sang".

The phrase "an aria" is a noun phrase and the direct object of the verb "sang".

The phrase "the tenor and the baritone" is a noun phrase and the subject of the verb "sang".

The word "a" is a determiner specifying the noun "duet".

The word "an" is a determiner specifying the noun "aria".

The word "and" is a coordinating conjunction.

The word "sang" is a past tense verb.

The word "sang" is the main verb of "the soprano sang an aria".

The word "sang" is the main verb of "the tenor and the baritone sang a duet".

The word "soprano" is a singular count noun.

The word "soprano" is the head of the noun phrase "the soprano".

The word "tenor" is a singular count noun.

The word "tenor" is the head of the noun phrase "the tenor and the baritone".

The word "the" is a determiner specifying the noun "tenor".

The word "the" is a determiner specifying the noun "baritone".
**SEMANTICALLY ANOMALOUS PARSE:**

The clause "the soprano sang an aria and the tenor and the baritone sang a duet" is a compound sentence.
The clause "the baritone sang a duet" is a statement.
The clause "the soprano sang an aria and the tenor" is a statement.
The phrase "an aria and the tenor" is a noun phrase and the direct object of the verb "sang".
The phrase "the baritone" is a noun phrase and the subject of the verb "sang".
The word "a" is a determiner specifying the noun "duet".
The word "an" is a determiner specifying the noun "aria".
The word "and" is a coordinating conjunction.
The word "sang" is a past tense verb.
The word "sang" is a past tense verb.
The word "sang" is the main verb of "the soprano sang an aria and the tenor".
The word "sang" is the main verb of "the baritone sang a duet".
The word "soprano" is a singular count noun.
The word "soprano" is the head of the noun phrase "the soprano".
The word "tenor" is a singular count noun.
The word "tenor" is the head of the noun phrase "the tenor".
The word "the" is a determiner specifying the noun "baritone".
The word "the" is a determiner specifying the noun "soprano".

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V3       |-----------------------------------------------------------|
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N3        C3        V1                                                          C1
|---------|---------|                            CCJ1                 |---------|---------|
|         |         |                                                 |         |         |
C3        N0        C0        V0                  N3                                      C0                                      V3
|        NOUN1     TNS       VERB1      |---------|---------|                            CCJ1                 |---------|---------|
|       soprano    PRS       sand       |         |         |                             and                 |         |         |
|                                       |         |         |                                                 |         |         |
C0                  C1                                      C3        N0                  C0                  V0                  N3
DET2            |-------------------|                   |        NOUN1     TNS       VERB3      |---------|
|                   |                   |                   |      baritone    PST       sang       |         |
|                   |                   |                   |         |         |         |                   |         |         |
C0                  N3                  C0                                      C3        N0
CCJ1       |---------|                  DET2                                     |        NOUN1
|         |                   the                                     |        duet
|         |                   |                                           |         |         |         |                   |
C0                  C3                  C0                                      C3        N0
DET1A       |---------|                  DET3                                     |        NOUN1
|         |                   tenor                                     |        a
|         |                   |                                           |         |         |         |                   |
C0                  DET3                  the
|         |                   |                                           |         |         |         |                   |
the
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APPENDIX II: RG DIAGRAMMING

1. Every word and abstract category (TNS, POS, Ø, [e], [u], etc.) must be dominated by some X0 which must be dominated by some X3.

2. Every sentence (V3) has a subject, a tense, and a main verb.

3. A phrase will contain an X2 and/or X1 level only if the phrase has X2 and/or X1 level elements. Some phrases are head-only, i.e., they never have an X2 or X1 (determiners, modals).

4. Each higher level of a phrase must be greater than or equal to the level below, that is, all the specifiers must be higher than all the modifiers which, in turn, must be higher than all the complements.

   a. OK: N3 above N3 above N2 above N2 above N2 above N1 above N1 above N0
   b. *: N3 above N2 above N3 above N2 above N1 above N2 above N1 above N0

5. There are three major syntactic categories: N, V, and C.

   a. V verb, modal, auxiliary (be and have), participle, infinitive
   b. N noun, pronoun, quantifier, gerund
   c. C adjective, (manner and sentence) adverb, preposition, particle, tense, possessive marker, determiner, degree words, emphatics, conjunctions

6. There are direct correspondences between RG and TG.

   a. V3 = S, MODP, etc. N3 = NP, QP, etc. C3 = PP, ADJP, ADV, etc.
   b. V2 = VP, MODN, etc. N2 = NQN, etc. C2 = PNADJNADVN, etc.
   c. V1 = VNN, MODN, etc. N1 = NQN, etc. C1 = PNADJNADVN, etc.
   d. V0 = V, MOD, etc. N0 = N, Q, etc. C0 = P, ADJ, ADV, etc.

7. modals: can, could, will, would, shall, should, may, might, must, do, does, did
determiners: the, this, these, that, those, a, an, no
quantifiers: all, some, each, every, none, much, many
degree words: so, as, too, that, this, how
emphatics: so, too, not
prepositions: in, out, off, on, up, down, near, around, about, from, with, by, at, before, after, etc.
tense (TNS): present (PRS), past (PST), future (FUT), conditional (CND), imperative (IMP)
coordinating conjunctions: and, but, or, etc.
subordinating conjunctions: because, since, although, if, unless, until, before, after, etc.

8. X3 elements are SPECIFIERS N3 V3
### Determiners Subject
Possessive marker Tenses
Quantifiers

### X2 elements are MODIFIERS
N2 V2
Numerals Expressions of time & place
Adjectives Adverbs
Predicate nominatives

### X1 elements are COMPLEMENTS
N1 V1
Complements Complements
Direct objects Direct objects
Compound elements

### X0 elements are elements of words
N0 V0
Particles Particles

### 9. a. nouns:
(1) noun1 singular count nouns show, play
(2) noun2 plural count nouns shows, plays
(3) noun3 mass nouns rice, bread
(4) noun4 proper nouns fred, lucy

### b. verbs:
(1) verb1 plural present tense verbs go, show, play
(2) verb2 singular present tense verbs goes, shows, plays
(3) verb3 past tense verbs went, showed, played
(4) verb4 passive and perfective participles gone, shown, played
(5) verb5 progressive participle going, showing, playing

### c. adjectives:
(1) adj1 positive adjectives good, happy
(2) adj2 comparative adjectives better, happier
(3) adj3 superlative adjectives best, happiest
(4) adj4 proper adjectives spanish, american

### d. adverbs:
(1) adv1 positive manner adverbs well, happily
(2) adv2 comparative manner adverbs better
(3) adv3 superlative manner adverbs best
(4) adv4 sentence adverbs probably
APPENDIX III: SYNTACTIC REPRESENTATION

(1) TRADITIONAL ANALYSIS:

SUBJECT = Person or thing performing the action of the verb.
OBJECT = Person or thing affected by the action of the verb.

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</tr>
<tr>
<td>DET</td>
<td>NOUN</td>
</tr>
<tr>
<td>the</td>
<td>student</td>
</tr>
<tr>
<td>book</td>
<td></td>
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</table>

PHRASE STRUCTURE RULES (PARENTHESES INDICATE OPTIONAL ELEMENTS):

SENTENCE $\varepsilon$ SUBJECT + AUXILIARY + PREDICATE
PREDICATE $\varepsilon$ VERB + (OBJECT)
AUXILIARY $\varepsilon$ MODAL
SUBJECT $\varepsilon$ (DET) + NOUN
OBJECT $\varepsilon$ (DET) + NOUN

PROBLEM: CONFUSION OF STRUCTURE AND FUNCTION

(a) The student will burn the books. He/she will burn them.
(b) The student will read the books. He/she will read them.
(c) The student will have the books. He/she will have them.

PROBLEM: TENSE IS NOT A SEPARATE ELEMENT OF AUX

(a) The student does read the books. Present Tense
(b) The student did read the books. Past Tense
(c) The student will read the books. Future Tense
(2) TG (TRANSFORMATIONAL GRAMMAR) ANALYSIS I:

\[ S = \text{SENTENCE} \]

\[ \text{AUX} = \text{AUXILIARY} \]

\[ \text{TNS} = \text{TENSE} \]

\[ \text{PRS} = \text{PRESENT TENSE} \]

\[ \text{PST} = \text{PAST TENSE} \]

\[ \text{FUT} = \text{FUTURE TENSE} \]

\[ \text{VP} = \text{VERB PHRASE} \]

\[ \text{V} = \text{VERB} \]

\[ \text{NP} = \text{NOUN PHRASE} \]

\[ \text{N} = \text{NOUN} \]

\[ \text{S} \]

\[ \begin{array}{c}
\text{NP} \quad \text{AUX} \quad \text{VP} \\
\text{DET} \quad \text{N} \quad \text{MODAL} \quad \text{TNS} \quad \text{V} \quad \text{NP}
\end{array} \]

\[ \text{the} \quad \text{student} \quad \text{read} \quad \text{NP} \]

\[ \text{does} \quad \text{PRS} \]

\[ \text{did} \quad \text{PST} \quad \text{DET} \quad \text{N} \]

\[ \text{will} \quad \text{FUT} \quad \text{the} \quad \text{book} \]

PHRASE STRUCTURE RULES:

\[ S \in \text{NP} + \text{AUX} + \text{VP} \]

\[ \text{VP} \in \text{V} + (\text{NP}) \]

\[ \text{AUX} \in (\text{MODAL}) + \text{TNS} \]

\[ \text{NP} \in (\text{DET}) + \text{N} \]

PROBLEM: PHRASAL STRUCTURE IS VERY DIFFERENT FOR DIFFERENT PHRASES.
(3) **TG (TRANSFORMATIONAL GRAMMAR) ANALYSIS II:**

\[
S \rightarrow \text{NP} + \text{TP} + \text{VP} \\
\text{VP} \rightarrow \text{V} + (\text{NP}) \\
\text{TP} \rightarrow (\text{MP}) + \text{T} \\
\text{MP} \rightarrow \text{M} \\
\text{NP} \rightarrow (\text{DP}) + \text{N} \\
\text{DP} \rightarrow \text{D} \\
\text{XP} \rightarrow (\text{XP}) + \text{X} + (\text{XP})
\]

**PHRASE STRUCTURE RULES:**

PHRASE STRUCTURE IS VERY DIFFERENT FOR DIFFERENT PHRASES.
(4) **RG (RESIDENTIAL GRAMMAR) ANALYSIS:**

V3 = VERB PHRASE  V = VERBS, AUXILIARIES, MODALS
N3 = NOUN PHRASE  N = NOUNS, PRONOUNS
C3 = CHARACTERIZER PHRASE  C = ADJECTIVES, ADVERBS, DETERMINERS, TENSE

X3 = SPECIFIER LEVEL  DETERMINERS, SUBJECT, TENSE
X2 = MODIFIERS LEVEL  ADJECTIVES, ADVERBS
X1 = COMPLEMENT LEVEL  DIRECT OBJECTS
X0 = HEAD/WORD LEVEL  COMPONENTS OF WORDS

### PHRASE STRUCTURE FRAME:

\[ X^n_0 \space (N3) + \space (C3) \space + \space X^n \space + \space (N3) \space + \space (C3) \]\n
where \( m \neq n \)
APPENDIX IV: SAMPLE PARSE ROUTINE

CATEGORY AND FRAME LOOKUP

<table>
<thead>
<tr>
<th>word</th>
<th>the</th>
<th>student</th>
<th>will</th>
<th>read</th>
<th>the</th>
<th>book</th>
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<tbody>
<tr>
<td>category</td>
<td>DET3</td>
<td>NOUN1</td>
<td>MODAL</td>
<td>MVERB</td>
<td>DET3</td>
<td>NOUN1</td>
</tr>
<tr>
<td>super-category</td>
<td>DETS</td>
<td>NSUBJ</td>
<td>VERBS</td>
<td>VPTD</td>
<td>DETS</td>
<td>NOUNS</td>
</tr>
<tr>
<td>frame</td>
<td>138</td>
<td>330</td>
<td>505</td>
<td>614</td>
<td>138</td>
<td>261</td>
</tr>
</tbody>
</table>

LEXICAL INSERTION

138 DETS
\[
[N3[C3=[C0{DETS}C0]=C3][N0{NNEI}N0]N3]
\]
\[
[N3[C3=[C0|the:<DET3>|C0]=C3][N0{NNEI}N0]N3]
\]

330 NSUBJ
\[
[V3[N3[N0{NSUBJ}N0]N3][C3[C0[V3=[V0{MODAL}V0]=V3][C0{MPT}C0]C0]C0][V0<MVERB>V0]V3]
\]
\[
[V3[N3[N0|student:<NOUN1>|N0]N3][C3[C0[V3=[V0{MODAL}V0]=V3][C0{MPT}C0]C0]C0][V0<MVERB>V0]V3]
\]

505 VERBS
\[
[V3[V0{VERBS}V0]V3]
\]
\[
[V3[V0|will:<MODAL>|V0]V3]
\]

614 VPTD
\[
[V3[V1[V0<VPTD>V0][N3[N0{NCOMP}N0]N3]V1]V3]
\]
\[
[V3[V1[V0|read:<MVERB>|V0][N3[N0{NCOMP}N0]N3]V1]V3]
\]

138 DETS
\[
[N3[C3=[C0{DETS}C0]=C3][N0{NNEI}N0]N3]
\]
\[
[N3[C3=[C0|the:<DET3>|C0]=C3][N0{NNEI}N0]N3]
\]

261 NOUNS
\[
[N3[N0{NOUNS}N0]N3]
\]
\[
[N3[N0|book:<NOUN1>|N0]N3]
\]
MERGING FRAMES

MERGE 138 & 330

138 \[N3[C3=[C0|the:<DET3>|C0]=C3] [N0\{NNEI\}N0]N3\]

330 \[V3[N3[N0|student:<NOUN1>|N0]N3] [C3[C0[V3=[V0\{MODAL\}V0]=V3] [C0\{\{MPT\}\}C0]C0]C3] [V0\{MVERB\}V0]V3\]

RESULT:

\[V3[N3[C3=[C0|the:<DET3>|C0]=C3] [N0|student:<NOUN1>|N0]N3] [C3[C0[V3=[V0\{MODAL\}V0]=V3] [C0\{\{MPT\}\}C0]C0]C3] [V0\{MVERB\}V0]V3\]

ABOVE MERGED WITH 505

505 \[V3[V0|will:<MODAL>|V0]V3\]

RESULT:

\[V3[N3[C3=[C0|the:<DET3>|C0]=C3] [N0|student:<NOUN1>|N0]N3] [C3[C0[V3=[V0\{MODAL\}V0]=V3] [C0\{\{MPT\}\}C0]C0]C3] [V0\{VERBS\}V0]V3\]

ABOVE MERGED WITH 614

614 \[V3[V1[V0|read:<MVERB>|V0] [N3\{N0\{NCOMP\}\}N0]N3] V1]V3\]

RESULT:

\[V3[N3[C3=[C0|the:<DET3>|C0]=C3] [N0|student:<NOUN1>|N0]N3] [C3[C0[V3=[V0\{MODAL\}V0]=V3] [C0\{\{MPT\}\}C0]C0]C3] [V1[V0|read:<MVERB>|V0] [N3\{N0\{NCOMP\}\}N0]N3] V1]V3\]

ABOVE MERGED WITH 138

138 \[N3[C3=[C0|the:<DET3>|C0]=C3] [N0\{NNEI\}N0]N3\]

\[V3[N3[C3=[C0|the:<DET3>|C0]=C3] [N0|student:<NOUN1>|N0]N3] [C3[C0[V3=[V0\{MODAL\}V0]=V3] [C0\{\{MPT\}\}C0]C0]C3] [V1[V0|read:<MVERB>|V0] [N3[C3[C0|the:<DET3>|C0]C3] [N0\{NNEI\}N0]N3] V1]V3\]

ABOVE MERGED WITH

261 \[N3[N0|book:<NOUN1>|N0]N3\]

OUTPUT:

\[V3[N3[C3[C0|the:<DET3>|C0]=C3] [N0|student:<NOUN1>|N0]N3] [C3[C0[V3[V0|will:<MODAL>|V0]V3] [C0\{\{MPT\}\}C0]C0]C3] [V1[V0|read:<MVERB>|V0] [N3[C3[C0|the:<DET3>|C0]C3] [N0|book:<NOUN1>|N0]N3] V1]V3\]
The clause "the student will read the book" is a statement.
The phrase "the book" is a noun phrase and the direct object of the verb "read".
The phrase "the student" is a noun phrase and the subject of the verb "read".
The word "book" is the head of the noun phrase "the book".
The word "book" is a singular count noun.
The word "student" is the head of the noun phrase "the student".
The word "student" is a singular count noun.
The word "the" is a determiner specifying the noun "book".
The word "the" is a determiner specifying the noun "student".
The word "will" is a modal auxiliary specifying the meaning of the verb "read".

V3

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N3                  C3

V1

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</tbody>
</table>

C3        N0                  C0

V0

|       NOUN1       |---------|
MVERB       |---------|

read        |         |

|         |         |
the book

MODAL

will