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THE EFFECTS OF A STUDY OF A GENERATIVE GRAMMAR
UPON THE STRUCTURE OF WRITTEN SENTENCES
OF NINTH AND TENTH GRADERS

DISSERTATION
Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By
Donald Ray Bateman, A.B., M.A.

* * * * * *

The Ohio State University
1965

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CHAPTER I

INTRODUCTION

It is a linguistic truism today that each language has its own unique set of grammatical characteristics. It is consequently a simple matter to understand why the eighteenth century adaptations of Latin grammar proved so unsatisfactory in the school curriculum and why the studies of the twenties and thirties that purported to investigate the relation between a knowledge of grammar and language facility produced only nugatory results.\(^1\) It is quite clear that what were thought to be conclusive results justifying a move from formal to functional grammar study were quite inconclusive and simply demonstrated the obvious fact that an illogical and unsystematic grammar derived from another language could contribute little to an understanding of the grammatical structure of English.\(^2\)

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\(^1\) The widespread belief that a failure to disprove the null hypothesis is a clear demonstration of the failure of the experimental treatment is quite false. There is no defensible position for the experimenter when no significant results have been obtained except that of suspended judgment. In other words, the so-called research of the twenties and thirties failed to show that fragmented and pre-scientific grammatical activities contributed in any significant way to language growth. For a relevant discussion of research design, see Lumsdaine, "Instruments and Media of Instruction," in N. L. Gage (ed.), Handbook of Research On Teaching, especially pages 664-667.

\(^2\) For a summary of these studies see Catherine Catherwood, Relationships Between a Knowledge of Rules and Ability to Correct Grammatical Errors. For an evaluation of such studies, including current research, see Braddock, Lloyd-Jones, and Schoer, Research in Written Composition and Meckel, "Research on Teaching Composition and Literature," in N. L. Gage (ed.), Handbook of Research On Teaching.
It should be noted, however, that it was generally concluded that the function of grammar was to eliminate those errors that had been identified by the pre-traditional grammarians of the eighteenth century. Consequently, when the grammatical content of English failed to eliminate such errors, it was convenient to conclude that grammar should not be taught systematically. This conclusion received considerable support from the structural linguist’s contention that language constantly changes and that correctness is dependent on such matters as time, place, and circumstance. Linguistic authoritarianism was officially rejected by the National Council of Teachers of English in 1952:

For generations the English language has been taught to children and youth as a set of fixed facts and principles, a logical structure of rules which govern the use of English in speech and writing. Deviations from this fixed set of rules have been considered to constitute errors; the observation of these rules presumably resulted in the correct use of English. This static and authoritarian point of view has persisted despite certain objective and glaring evidences to the contrary and despite the published work of generations of competent linguists who have without exception repudiated the authoritarian position.³

One would presume that such a clear and authoritative statement would have revolutionized the teaching of English and that textbook writers and testmakers would have re-examined their functions. It is obvious that this has not happened. There are still tests that ask the

student to choose the "correct" answer to test items that have been designed to illustrate rules that have little application to English:

(1) They gave the money to me who (is, am) the treasurer.  

Many of our tests and textbooks deal with an artificial language that exists only for the purpose of illustrating rules that do not clearly apply to English. In the test from which (1) was taken almost thirty per cent of the items in the "correct" usage section require the student to use a rule that is either inapplicable or inaccurate. For example, many teachers insist that the pronoun preceding a gerund be in the genitive case. This rule has had a curious history: early nineteenth century grammarians claimed that the genitive could not stand before the gerund, since an adjective could not be placed in that position; Victorian grammarians required the genitive; and many twentieth century grammarians have felt that either the genitive or the accusative case may be used, though certain restrictions have been identified.  

(2) I don't approve of men drinking. (genitive rare or impossible)

(3) It was a case of imagination getting out of control. (genitive impossible)

(4) In spite of the plan of the committee being voted down no one could offer a better one. (genitive impossible)

(5) Who could have thought of him (stressed) getting the job. (genitive impossible)

(6) His coming was all that she looked forward to. (objective case impossible)

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4The Ohio Every Pupil Tests. These tests provide a rich source of such examples.

Many authoritarian statements about correct usage are simply unjustifiable. In spite of this fact the most widely used textbooks perpetuate grammatical rules that require illustrative sentences such as (1) or overgeneralized rules, such as the genitive before the gerund; and teachers, often under administrative pressure, feel obliged to carry on the tradition.

Available explications of what constitutes adequate research design make it quite clear that thirty years of functional grammar—the application of fragments of fragmentary grammars to specific problems of usage—received its operational justification from studies that have no experimental validity whatsoever. Henry C. Meckel’s conclusion is generous:

Discounting present practices in the schools and considering only the substantial body of recent linguistics research and theory, much of the earlier research on teaching grammar must be regarded as no longer of great significance outside the period in educational history which it represents.

The earlier "research" on teaching grammar did result in a needed evaluation of the English program. However, it yielded two illogical conclusions that we are apparently still constrained by:

1. The study of formal grammar has as its only function the establishment of "correct" usage.

2. The failure of the study of Latinized grammar to improve usage is sufficient justification for the conclusion that the study of formal grammar has no educative function.

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7Ibid., p. 982.
The fundamental illogicality underlying these conclusions should be immediately evident: a demonstration of the ineffectiveness of pre-traditional grammar as an instrument for the improvement of English usage does not lead to the conclusion that formal grammar study has no educative function. Since we have not attempted to develop English grammar with a group of students over a period of years and have not seriously explored the possibilities of accelerating language growth through increased knowledge of the structure of English, \(^8\) we cannot know what the results of such a program would be. It may be that the move away from formal grammar study was the only possible course of action thirty years ago simply because there was no English grammar to substitute for the defunct one, though this can no longer be said.

**Analytic Grammars**

The substantial body of linguistic research and theory referred to by Meckel\(^9\) may be subdivided into two widely differing kinds of systematic grammars: analytic and synthetic. Analytic grammars are pre-scientific in that they are primarily classificatory and deal exclusively with limited samples of the language. From the point of view of the English teacher it would seem reasonable to suppose that analytic grammars would be a fruitful source for new grammatical content.

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\(^8\) For a report of a study with an eighth grade class based on immediate constituent analysis of patterns of English see Donald R. Bateman, *Speculations Concerning Symbolism, the Communication Core, Language*. A more formal study of language change based on generative grammar may be found in Donald R. Bateman and Frank J. Zidonis, *The Effect of the Knowledge of a Generative Grammar on the Growth of Language Complexity*.

\(^9\) *Loc. cit.*
Much current innovation has in fact had its origin in this supposition and the majority of informal studies appearing in the educational journals attest to the growing popularity of some form of analytic grammar as the basis for improved language study. A critical review of the most familiar sources of grammatical content of this sort will illustrate the strengths and weaknesses of analytic grammars and will provide the necessary background for a description of the characteristics of synthetic grammars.

The development of analytic English grammars has been proceeding rapidly since Charles Fries' *The Structure of English*. Though it is not clear that it was widely read, this early volume presented in a clear and simple way the "substitution-in-frames" procedure for identifying parts of speech. The use of basic sentence patterns as test frames for classifying lexical items was an improvement over the frequent ambiguities of traditional definitions. For example, in compounds such as "school teacher," "school" is clearly the name of a place and is therefore a noun, but since it modifies the noun "teacher" it must also be an adjective. The introduction of appropriate test frames eliminates the problem of definition by classifying words by structural environment rather than semantic definition.

Both "school" and "teacher" will fit in the test frame "The _________ is there" and must therefore belong to the same class of words. There is no possibility of confusing a word like "happy" with "school" simply because they can...

---

10 The inadequacy of test frames as a discovery procedure for word classification is thoroughly demonstrated in R. B. Lees, "On the So-Called 'Substitution-in Frames' Technique," to appear in *General Linguistics*. 
both modify the same word, for "happy" cannot fit in the same test frame as "school."

In order to avoid the ambiguous definitions of traditional grammar Fries attempted to develop a new grammatical vocabulary. It seemed reasonable to suppose that an accurate description of the parts of speech of English could be empirically evolved in the classroom by the use of test frames and a new set of terms which could not be associated with traditional definitions. Though the new terminology—which consisted of numbers for nouns, verbs, adjectives, and adverbs, and letters for function words—did not catch on in the schools, it did provide a procedure for language study that was more in keeping with the data-collecting aspect of scientific practice. The existing language (not the artificial language of which (1) is an example) became the corpus to be described, and what were thought to be the soundest scientific principles were followed.

What has been popularly identified as the "new grammar" clearly had its origin in The Structure of English. A series of adaptations and developments followed, with Paul Roberts' Patterns of English containing the most systematic presentation of the substitution-in-frames technique.

Following the lead of Fries and picking up additional knowledge of the intonational patterns of English from An Outline of English Structure by George Trager and Henry Lee Smith, Roberts presented the first relatively complete textbook. Patterns of English, in the traditional structural manner, defines parts of speech according to structural environment and by presenting patterns of increasing
complexity attempts to illustrate how simple structures of English may be expanded. The goal, apparently, is to help students identify the simple structures which are the building blocks of language and to help them recognize the relationships between these simple structures and the more complex structures frequently encountered. This goal is accomplished by presenting lists of structures, in the traditional manner, and descriptive formulas, in the structural tradition. The procedure, then, is to lead the student from such simple sentences as "The cat purred happily" to "The great big ugly-looking alley cat purred happily." There is some reason to believe that students who intensively engage in pattern practice can learn to write formulas which describe sets of sentences listed in exercises and can learn to produce sentences by substituting lexical items in formulas listed in exercises, but there is the not unfounded suspicion that this activity may result in such dubious sentences as "The happy little boy with the red hair who lives on the other side of town loves the pretty little girl with the blue bonnet who walked beside you at the Easter parade."

Nevertheless, the attention to pure structure eliminated many of the problems of definition that often plagued classroom grammatical study. An examination of the structural ambiguity frequently present in newspaper headlines is the only attempt in Patterns of English to relate grammar and meaning. Roberts illustrates this point with the following headline:

Army Demands Change

which can mean either

The army demands a change
Army demands have changed.

These sentences serve to illustrate how function words (the, a, have) are a key part of the structural environment that defines what form class a word is. Both "change" and "demands" can be either noun or verb. It seems evident that this sentence presents a more realistic grammatical problem than (1) does.

Neither Fries nor Roberts dealt with the phonology of English in any detailed way, even though structural linguists had persistently declared that the spoken language was the language and that any grammatical description of English must proceed from phones to phonemes to morphemes to phrases to sentences. The hypothesis that a scientific grammar consists of an orderly procedure for showing how the building blocks of sentences are phonological units that determine the syntactical structure of utterances is explored most fully in Archibald Hill's An Introduction to Linguistic Structures; From Sound to Sentence in English. The content of this book exemplifies scientific method as understood by the structural linguist. The orderly analysis of the constituent parts of English speech characterizes what W. Nelson Francis called "a long overdue revolution . . . of English grammar . . . as sweeping in its consequences as the Darwinian revolution in biology."11 The revolutionary grammar was of course structural and was eulogized as follows:

... the superseding of vague and sloppy thinking by clear and precise thinking is an exciting experience.

in and for itself. To acquire insight into the workings of a language, and to recognize the infinitely delicate system of relationship, balance, and interplay that constitutes its grammar, is to become closely acquainted with one of man's most miraculous creations, not unworthy to be set beside the equally beautiful organization of the physical universe. And to find that its most complex effects are produced by the multi-layered organization of relatively simple materials is to bring our thinking about language into accord with modern thought in other fields, which is more and more coming to emphasize the importance of organization—the fact that an organized whole is truly greater than the sum of all its parts.12

The extent to which this enthusiastic endorsement of the scientific status of structural linguistics is justifiable depends on whether it is accurate to consider scientific method a taxonomic, data-cataloging activity. When François refers to the "long overdue revolution . . . of English grammar" that is as "sweeping in its consequences as the Darwinian revolution in biology," he is evidencing a surprising lack of understanding of the kinds of activities that characterize the scientific method. Robert B. Lees has raised the pertinent questions:

". . . at what stage of development are our ideas on grammar? Do we deal with grammatical theories, and if so, are those theories characterized by consistency, cohesion with other branches of behavioral science, elegance of statement, i.e. powerful generality, and compatibility with linguistic intuition?"13 The answers seem quite clear:

When we compare a modern descriptive grammar with an old-fashioned prescriptive grammar of a century ago, we are accustomed to dismiss the latter as unscientific, especially to the extent that it slavishly reproduces

12 Ibid., p. 60.

Latin and Greek grammatical categories in an effort to order the data of a non-classical language. But what more is our descriptive grammar than another reordering of the data—now, to be sure, according to a less traditional scheme of categories, but nonetheless according to an arbitrary set of descriptive labels which has become fossilized within linguistic tradition? Thus without giving any internal justification, no reasons derived from a theory of language structure and behavior, the empirical data are organized in our descriptive grammar into chapters on Phonemes, Morphophonemics, Word-formation, The Noun, The Verb, Particles, and possibly Syntax, the whole intended from the very beginning to be just a classification of utterance fractions so that they may be successively mentioned from the first to the last page of the grammar in some manner other than randomly.\(^4\)

A system for collecting and classifying data is pre-scientific, however explicit it is, whereas a true scientific discipline is characterized by the explanatory power of its theoretical constructs. A scientific grammar, then, cannot be equated with an explicit procedure for collecting and classifying data; it must also provide a theoretical account of the grammatical behavior of the native speaker; and the adequacy of such a grammar depends wholly on the success with which this task is accomplished.

The magnitude of the failure of analytical grammars is exemplified clearly in Hill's *Introduction to Linguistic Structures*. Both the strengths and weaknesses of the *Introduction* are a result of Hill's strict adherence to what he considers to be sound scientific procedure. For example, he begins with the phonemic analysis of Trager and Smith, which, he says, "is capable of being revised when revisions are shown to be needed," but not refutable until "a more consistent, more complete, \(^{14}\)Ibid., p. 377.
and more simple analysis" is made.\textsuperscript{15} Hill's description of the procedure for defining a phoneme will again illustrate what Hill takes to be scientific method: "The inventory of contrasts is built up in much the same way that a cryptogram is solved. Starting assumptions are made and abandoned if they do not prove fruitful; as long as they lead to other assumptions consistent with the first, they are continued as working hypotheses, until finally all contrasts have been accounted for."\textsuperscript{16} Through a strict adherence to such procedures throughout the book Hill was able to develop an extremely explicit procedure for describing a particular corpus of the language.

What appears to be the greatest strength of the book is the source of its greatest weakness. Even though Hill constantly demonstrates the strengths of his system by examining unusual structures\textsuperscript{17} and showing how they can be included in the corpus of utterances encompassed by the system, he is occasionally led into absurdity by being forced to adhere to a principle of analysis not because it is effective but because it is part of the system. For example, Hill's commitment to a particular procedure of immediate constituent analysis leads him into what would seem to be an untenable description of the discontinuous predictor in "John picked the books up." He says, "It seems

\begin{itemize}
\item \textsuperscript{15} Op. cit., p. 61.
\item \textsuperscript{16} Ibid., p. 49.
\item \textsuperscript{17} I.e. unusual structures for grammar books, though usual utterances. The "usual" example that frequently appears in tests on correct usage (e.g.: They gave the money to me who (is, am) the treasurer.) is unutterable, just as many of the "usual" sentences in the grammar sections of high school English books are chosen to illustrate the grammar rather than language as it is known and used by the students.
\end{itemize}
inescapable that the constituents are \textit{picked} \ldots \textit{up} and \textit{the books}.

The double cut before and after \textit{the books} which would be necessary to arrive directly at a constituent \textit{picked} \ldots \textit{up} is a kind of cutting we have tried to avoid if possible. Even more, a process of normalizing, by transposing to continuous order, is to be avoided since such transposition does violence to the actual facts of the language.\textsuperscript{18}

The problem is finally solved by making the second cut before \textit{up}, giving \textit{picked the books} and \textit{up}, which, he says, "is justifiable primarily by the fact that \textit{picked the books} is a more likely independent construction than \textit{the books up} and by the analogy of \textit{helped them work} which we have cut (see page 277) into \textit{helped them and work}."\textsuperscript{19} The next cut is made between \textit{picked} and \textit{the books}, which leaves the three troublesome elements \textit{picked, the books,} and \textit{up}, as separate constituents, the first and last of which can now be reassembled. "The justification for reassembling them is the occurrence of the variant construction in which they are in continuous order."\textsuperscript{20}

Synthetic Grammars

\textbf{Observational adequacy}—the presentation of the data completely and without errors—is an analytical grammar's highest achievable goal. Synthetic grammars, on the other hand, in attempting to give an explicit account of the linguistic system underlying the data, strive to achieve descriptive adequacy, and, to the extent to which the linguistic system is related to a general theory of language, they strive

\begin{center}
\textsuperscript{18}Ibid., p. 289. \hspace{1cm} \textsuperscript{19}Ibid., p. 289. \hspace{1cm} \textsuperscript{20}Ibid., p. 290.
\end{center}
to achieve explanatory adequacy. A discipline clearly fails to achieve scientific status if it is unable to transcend the pre-scientific goal of observational adequacy.21

As the term suggests, a synthetic grammar presents a theoretical account of the process of sentence formation. This shift in emphasis from analysis to synthesis should be welcome to the English teacher, whose primary task is to help the student become a more effective and proficient sentence-producer. Furthermore, the synthetic grammarian's concern with well-formedness provides an effective counter to the statistical determination of "correctness" that has plagued the teacher throughout the reign of structural linguistics. The excessive emphasis on the patterns of speech has failed to uncover the linguistic system that underlies the language. Noam Chomsky's comment should clarify this point:

It is first of all clear that the formalized grammar, regarded as a predictive theory, is an idealization in at least two respects: first, in that it considers formal structure independently of use; and second, in that items that it generates will not be the utterances of which actual discourse is composed, but rather they will be what the untutored native speaker knows to be well-formed sentences. Actual discourse consists of interrupted fragments, false starts, lapses, slurring, and other phenomena that can only be understood as distortions of an underlying idealized pattern. It would be absurd to try to incorporate these phenomena directly into a formalized grammar. Actual speech

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21 A detailed discussion of levels of adequacy may be found in Noam Chomsky, "Current Issues in Linguistic Theory," in Jerry A. Foder and Jerrold J. Katz (eds.), The Structure of Language, pp. 62-79.
is clearly a complex process in which many interacting factors play a part, not all of which fall within the domain of grammatical study.\(^2^2\)

The grammar Chomsky is referring to is generative grammar and it has as its goal the description of the linguistic system that underlies the native speaker's ability to produce what for all practical purposes may be called an infinite number of the sentences of his language. A generative grammar avoids the descriptive limitations that result from using the patterns of speech as a model by developing an idealized description of the language; it simplifies the description and provides a meaningful account of complex sentence formation by limiting direct immediate constituent description to a kernel of basic sentences that are simple, declarative, and active and deriving all other sentences from these kernel sentences by transformational rules.

A synthetic grammar of this kind is described as follows:

A grammar of the language L is essentially a theory of L. Any scientific theory is based on a finite number of observations, and it seeks to relate the observed phenomena and to predict new phenomena by constructing general laws in terms of hypothetical constructs such as (in physics, for example) "mass" and "electron." Similarly, a grammar of English is based on a finite corpus of utterances (observations), and it will contain certain grammatical rules (laws) stated in terms of the particular phonemes, phrases, etc. of English (hypothetical constructs). These rules express structural relations among the sentences generated by the grammar beyond the corpus (predictions).\(^2^3\)


\(^2^3\)Syntactic Structures, p. 49.
A generative grammar, then, might be thought of as a model of
the device in the native speaker's head that makes it possible for him
to produce sentences of the language. The problem of trying to under-
stand the nature of this device is not unlike the problem of trying to
understand the behavior of the hypothetical particles inside the atom.
We cannot directly observe an atom; neither can we observe the device
inside the native speaker's head. Yet, in both cases, we can develop a
theory based on a finite number of observations that will enable us not
only to organize the data but to predict the occurrence of new phenomena.

When Chomsky says that a grammar is "a device of some sort . . .
for generating all and only the sentences of a language," he is talking
about a theoretical model of the native speaker's capacity for produc-
ing a never-ending stream of sentences. A grammar of this sort could
be thought of as an automaton that could, through an ordered application
of rules, produce well-formed and only well-formed sentences of the
language.

Criteria for Evaluating the Grammars

The characteristics of the four kinds of grammar discussed in
this chapter (pre-traditional, traditional, structural, and generative)
and their relative adequacy as formal systems can be clarified graphi-
cally. Two evaluative criteria can be usefully employed here: (1)
explicitness and (2) significance of goal. By explicitness we shall
mean the clear and unambiguous definition of terms; by significance of
goal we shall mean the hierarchy which at the lowest level accepts
observational adequacy as sufficient and at the highest level accepts
only explanatory adequacy. Karl Teeter's description of levels of adequacy will help to clarify this criterion:

... a grammar which presents the data completely and without errors is 'observationally adequate'. Where an explicit account is also given of the linguistic system underlying the data, a grammar approaches 'descriptive adequacy'. Finally, where principled reasons based on a general theory of language force the analysis of the data in the descriptively correct way, the resultant complete grammar (none has ever been written) would be one to which 'explanatory adequacy' could be attributed. Explanatory adequacy, with all of the difficulties in attaining it, must be the goal of our grammars if our hopes for scientific significance are to be truly approached. And for a well-known and well-studied language like English or French, a grammar which is adequate only on the observational level, which merely reasserts the data neatly, is quite useless.  

Explanatory adequacy would require a grammar to investigate and account for the fundamental rules that underlie the native speaker's ability to produce and understand an infinite number of novel sentences of his language. The word novel must be emphasized in the context, for if the native speaker simply memorized sentences and repeated them on the proper occasion, then an adequate representation of the language would require only the traditional grammarian's extensive listing of available sentence patterns.  

But the native speaker's ability to produce and understand sentences he has never before heard requires him to have developed a set of generative rules that makes it possible for him to "project the finite set of sentences he has fortuitously

---


encountered to the infinite set of sentences of the language.Æ26 Explanatory adequacy would require a complete description of this ability, and explanatory adequacy is the only goal that could be considered adequate in a truly scientific framework.

The illustration on page 19 classifies the four grammars graphically, the horizontal axis indicating the degree of explicitness, the vertical axis indicating the extent to which the grammar strives for significance of goal. Both traditional and generative grammars are ranked fairly high on the "significance of goal" axis, indicating that both are concerned with the matter of sentence formation.

The goal of a traditional descriptive grammar is to enable the reader to understand and freely produce arbitrary sentences of the language it treats; to enable him in other words, to match the judgment and behavior of the native speaker. Paired with an intelligent and comprehending reader, a good traditional grammar often achieves a high degree of success in this attempt. I think it is fair to say that we have very little understanding of how this success is attained, and that a sharp reversal in the direction of current linguistic studies will be necessary if any substantial insight into such questions is to be achieved.Æ27

A traditional grammar may rank high on the "significance of goal" axis, but it can only be successful when matched with an intelligent learner who somehow is able to develop the generative rules underlying the mass of data presented by the grammar. But this ability the native speaker and the intelligent learner exhibit is precisely the thing that an adequate grammar should account for, not depend on.


Significance of Goal

(Explanatory)
*GG

(Descriptive)
*TG

(Observational)
*SG

Explicitness

*PG

PG=Pre-traditional Grammar
SG=Structural Grammar
TG=Traditional Grammar
GG=Generative Grammar
Traditional grammars have always attempted to account for the structures available to the native speaker by classifying the sentences that appear in a given corpus (i.e., a set of texts). If the native speaker produces sentences by selecting them from a store of sentences that he has accumulated through experience, then the attempt to list the structures available to him should provide an adequate model of his ability to produce such sentences. But if there is a creative aspect to the native speaker's sentence-generating ability, then a model that does not provide for the composition of previously unuttered sentences is inadequate. From this point of view, then, Otto Jespersen's great seven-volume grammar of English is a grammar of the sentences that appear as examples in the seven volumes.

Traditional grammars, then, though concerned with the significant and interesting matter of sentence formation, must deal with limited data (the corpus) in an inexplicit way, must depend on the intelligent learner for success, and must finally fail as grammars meeting the test of descriptive or explanatory adequacy.

A second observation recorded on the graph is the low ranking of traditional grammar and the high ranking of generative grammar on the explicitness scale. As an illustration of this, let us examine the usual traditional definition of the passive voice:

In the passive voice the grammatical subject is the receiver rather than the performer of an action.

If one attempts to apply this definition to the following sentences, (1) would be called a passive, (2) an active, and (3) would be extremely puzzling.
(1) The boy received a blow in the mouth.

(2) The boy hit the ball.

(3) A triple was hit by the boy.

In (1) it is the boy who is the receiver of the action, in (2) it is the boy who performs the action, and in (3) though the boy performs the action, it is not clear that the action is performed upon the triple. Such notional definitions of grammatical characteristics produce vague and inexplicit results. It seems clear that the relation between subject and object and active and passive is only sometimes related to receivership.\(^\text{28}\)

A third observation recorded on the graph is the high ranking of structural grammar on the explicitness axis and its low ranking on the significance of goal axis. The structural grammarian has developed a number of extremely explicit procedures for analyzing specific samples of any language. A structural grammar, then, is simply an analytical device. It is a procedure for analyzing data, but not a set of provisions (a theory) for specifying which data are significant. There is no provision in a structural grammar for organizing the data in any significant way. It is not possible for a structural grammarian to deal specifically with the question of sentence formation. Given a corpus (however this is done when there is no procedure for selecting the items contained in the corpus), the structural grammarian can make an explicit analysis of it, though he cannot provide an adequate explanation of how the native speaker of that language is able to create

\(^{28}\)For an explicit account of the grammatical relationship between the active and passive, see below in Chapter II, pp. 113 ff.
a never-ending and seldom-repeating set of generally well-formed sentences. Structural grammar has been most useful to missionaries who have had to go to a country in which the language has no written form. The explicit analytical device apparently provides a procedure for identifying the basic grammatical elements of the unknown language and simple verbal communication can be initiated.

Furthermore, it turns out that the structural grammarian can apply his analytical procedures with justifiable confidence only to the simple sentences of the language and even some of the simple ones seem to resist structural analysis. Hill, for example, wedded as he is to an analytical procedure, is unable to provide an adequate account of the discontinuous predbator in the sentence "John picked the books up." Similarly, Hill is unable to discover any grammatical basis for distinguishing the following sentences:

(1) I gave John a book.
(2) I called John a fool.

The terms "indirect object," "direct object," and "objective complement" indicate semantic distinctions, he says, and there is "nothing in the formal structure [that] distinguishes one relationship from the other."\(^{29}\)

Finally, pre-traditional grammar receives a negative evaluation in respect to both criteria. That is to say, it is neither explicit nor does it deal with the process of sentence formation. It originated at the end of the 18th century and provides the "basis" for most of

\(^{29}\)Hill, op. cit., p. 296.
the prescriptions that seem to make up a large portion of our "grammar books."

There is a high correlation between low ranking on the graph and amount of time spent on the system in the schools. That is, pre-traditional grammar is the lowest ranking system and the most often used and taught; generative grammar, the highest, and yet least used in the schools. Clearly, current evaluations of the English program make it mandatory for teachers to become involved in curriculum development. The dubious status of the "research" of the twenties and thirties as well as the illogical conclusions that shaped much of the present language arts program should provide sufficient motivation for teachers to explore generative grammar as a source for new content in the English program.

At this stage in the development of grammars, there is still little material dealing with generative grammar that is easily available to the English teacher. The need for explanation is great: the symbology of generative grammar is presently more congenial to the mathematician than the English teacher; the role of theory in scientific investigation is not presently part of the academic background of the English teacher; descriptions and discussions of generative grammars appear almost exclusively in technical journals for linguists.

Current research projects dealing with the role of generative grammar in the English program suggest that the framework of first language study will almost certainly undergo revolutionary change within the next few decades—the extent of the time lag between what is known and what constitutes a course of study is dependent on both
pressures of the times and the availability of understandable materials for study. The scarcity of the latter provides the motivation in the following chapters for the formal explication of a phrase structure component of a generative grammar, the informal discussion of the transformational component, and the description of a formal investigation in which high school students made a detailed study of a generative grammar.

The primary purpose underlying the detailed account in Chapter II of the phrase structure component of the grammar is to clarify the symbology of generative grammar so that more detailed and technical discussions of grammatical systems in the journals and in reports of current research can be read with understanding by teachers. Since a phrase structure grammar cannot be developed independently of transformations, sufficient discussion of transformational operations will appear in the chapter to familiarize the reader with the formal characteristics of this aspect of the grammar. Detailed accounts of transformational rules may be found elsewhere.

The informal discussion in Chapter III of some of the transformations of English will indicate the scope of this component and will specify the ways in which the simple, kernel sentences described by the phrase structure grammar may be combined into complex structures, thus providing a framework for the description in Chapter IV of a two-year experiment in which generative grammar was studied by students in grades 9 and 10. Analysis of data and conclusions are presented in Chapters V and VI.
CHAPTER II

THE PHRASE STRUCTURE COMPONENT OF A GENERATIVE GRAMMAR

It is customary to treat only the simple, affirmative, declarative sentences (kernel sentences) in the phrase structure component of a transformational generative grammar.\(^1\) The reason for this is fairly simple: a careful description of the kernel sentences in English provides all the structures one needs in order to account for the formation of the complex structures. The phrase structure component (kernel grammar), though, must be developed in terms of the relationships that seem to hold between the simple and the complex structures. Hopefully, the ideal kernel grammar would provide the simplest base upon which to construct the other components of the grammar in the simplest way. It is our intention to explore the rules of the kernel grammar in such a way that it will be possible to examine the transformational component of the grammar informally. The reason for treating the kernel grammar formally and the transformational rules informally is suggested by the somewhat specialized motivation of this study to provide an explication

\(^1\) Readers of extant generative grammars will recognize the derivative character of these phrase structure rules and of the transformational rules presented in the following chapter. Those interested in the sources of generative grammar might examine Noam Chomsky's Syntactic Structures, and his "A Transformational Approach to Syntax" in Third Texas Conference on Problems of Linguistic Analysis in English; Robert B. Lees' Grammar of English Nominalizations; and Charles Fillmore's Reports #1, 3, and 7 in Project on Linguistic Analysis, The Ohio State University Research Foundation.
of a generative grammar that could be adapted to a study of stylistics in the junior high or high school English class. It is not the aim to make generative grammarians of the students, which would entail their writing generative grammars, but rather to help them become stylists who have expanded their capability of generating varied and well-formed sentences of the language. The requirement of learning how to reconstruct the transformational history of a complex sentence, which the student must learn to do in order to describe stylistic characteristics and well-formedness, is somewhat alien to a generative grammar, which generates sentences but does not analyze them. Consequently, one must have sufficient understanding of how the grammar operates to be able to reconstruct the steps through which a sentence has passed in its formation. Fairly extensive classroom exploration indicates that a kernel grammar can be taught rather easily in a formal, explicit way; only in this formal way can the significant characteristics of the theory underlying the grammar be adequately explored. Furthermore, an explicit account of the kernel sentences introduces the student to many of the transformational rules since the close relationship between the simple and the complex provides the basis for defining the terms of the grammar. When students can clearly distinguish between kernel and non-kernel sentences, the reconstruction of complex sentences becomes a simple matter.

Each term and each rule in an ordered set of rules cannot exist independently of the other terms and rules in the set. Consequently, the meaning of specific terms becomes increasingly clear as the set becomes more and more complete. A full understanding of a logical
whole is only possible after the interrelationships that hold among the parts have been grasped. In an examination of a kernel grammar this problem is intensified by the fact that the kernel grammar cannot exist independently of the transformational component. We shall try to obviate this problem by fully discussing each rule as it appears, thus developing the characteristics of the total grammar informally as we develop the rules of the kernel grammar formally.

The first rule of the grammar states that the simple declarative sentence $S$ consists of a subject $\text{Nom}$ and a predicate $\text{VP}$ with the additional possibility of certain optional adverbial elements $\text{Adv}$.

$$(1) \quad S \rightarrow \text{Nom} + \text{VP} (\text{Adv})$$

Rule (1) could be translated into natural language as follows: the symbol $S$, which stands for sentence, may be expanded into its constituent parts, which are, a subject (Nom) and a predicate (VP). Simple sentences of this type may also include certain adverbial constructions. The arrow stands for the operation of rewriting the symbol $S$ into its component parts, and the $(\_\_)$ indicates that the $\text{Adv}$ is optional. The term $\text{Nom}$ suggests nominal and the symbol $\text{VP}$ suggests verb phrase.

Rule (1) permits us to analyze sentences as follows:

<table>
<thead>
<tr>
<th>Nom</th>
<th>VP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (a): The boy</td>
<td>is happy.</td>
</tr>
<tr>
<td>(b): The boy</td>
<td>became sick.</td>
</tr>
<tr>
<td>(c): The boy</td>
<td>hit the ball.</td>
</tr>
<tr>
<td>(d): The boy</td>
<td>became a man (at the game) (yesterday).</td>
</tr>
</tbody>
</table>
The exact specification of the constituents Nom and VP requires
the expansion of these complex symbols into their constituent parts:

(2) VP \rightarrow (\text{prev}) \text{ aux} + MV

The VP constituent of simple declarative sentences can be
expanded into an optional prev, which consists of a variety of affirmative
and negative pre-verbal words (not, hardly, scarcely, seldom,
almost, always, often); an auxiliary, aux, which will be expanded in
Rule (33); and an MV, which includes a variety of classes of verbs and
post-verbal structures. Before we can illustrate how Rule (2) expands
our understanding of a kernel sentence, we must determine the constituent parts of MV:

\[
(3) \quad \text{MV} \rightarrow \begin{cases} 
\text{Be + pred} \\
V_b
\end{cases}
\]

Rule (3) introduces a new symbol, braces, which mean "either-
or." In other words, at this stage our sentence-generating machine has
an option: it may choose either Be + pred or V_b. It may seem strange
to separate the verb Be from all other verbs in the language. This is
not done arbitrarily, but is required by the structure of certain complex sentences in English which require Be as the finite verb in one of
the kernel sentences of which the complex sentence is composed. For
example, the reduced relative clause has its origin in a constituent sentence in Be:

3 (a): The boy (who is) on the corner became my friend.

The kernel sentences underlying this sentence are:

3 (b): The boy became my friend.
The boy is on the corner.
If we wished to formulate a rule which described the conditions under which the relative clause may be reduced, as it is in 3(a), it would be necessary to specify that the finite verb of the kernel sentence underlying the relative clause must be Be. There are other places in the transformational component of the grammar in which it is convenient to refer to all verbs other than Be. For example, the question transformation that changes John smiles frequently into Does John smile frequently would have to exclude Be, since there is no Does John be happy?

An examination of many simple sentences containing Be as the finite verb indicates that pred may be an adjective, a noun, or an adverb of location:

\[
(4) \text{pred} \longrightarrow \begin{cases} 
\text{Nom} \\
\text{Adj} \\
\text{Loc}
\end{cases}
\]

4(a): The boy is the president.
   The boy is happy.
   The boy is here.

The term \(V_b\) may now be expanded:

\[
(5) \ V_b \longrightarrow \begin{cases} 
\text{stay} & \text{+ pred} \\
\text{remain}
\end{cases}
\]

\[
\begin{cases} 
\text{become} & \text{+ \begin{cases} 
\text{Adj} \\
\text{Nom}
\end{cases}} \\
V_L & + \text{Adj} \\
V
\end{cases}
\]

Since \(V_b\) has its origin in \(VP\), it should be remembered that the optional \(Adv\) in Rule 1 still applies to expansions of \(VP\). Consequently, it is possible to have additional optional adverbial elements following any of the sentences described by Rule (5). It should be noticed that
Rule (5) specifies all the verbs that could not be classified as transitive, intransitive, or middle (i.e., verbs like have, weigh, resemble which have no passive form, as the transitive verbs do, but do not share the characteristics with such verbs as Be, Become, Stay, and Remain, which also can have nouns as complements). In Rule (5) stay and remain share pred with Be but differ from Become, which cannot be followed by Loc, adverbials of location.

5(a): The boy stayed tired.
   The boy stayed there.
   The boy stayed president.

(b): The boy remained happy.
   The boy remained there.
   The boy remained chairman.

(c): The boy became tired (easily).
   The boy became a man (rapidly).
   *The boy became there. (The asterisk indicates a non-S.)

The optional adverbial elements that (Adv) provides for may be illustrated as follows:

5(d): The boy stayed tired (throughout the game).
   The boy remained happy (for many years).
   The boy became a man (rapidly) (during the tennis match).

The symbol \( V_L \) refers to all verbs that choose only Adj as post-verbal element:

5(e): The man felt tired.
   The horse turned blue.
   The balcony appeared strong.

Here, too, optional adverbial elements are possible.

A difficult pedagogical problem can occur, if it has not been anticipated, when the transitive or intransitive homophones of these verbs are cited as examples of \( V_L \)'s followed by nouns:

5(f): The man felt the cloth.
The boy turned the key.
My friend grows melons.
George appeared at the game.

The problem can be avoided by showing that other $V_L$'s not having homophonous counterparts may be substituted in sentences of the type appearing in 5(e), but not in 5(f):

5(g): The man became tired.
*The man became the cloth.
The horse became blue.
*The boy became the key.
The balcony seemed strong.
*George seemed at the game.

There are a number of other examples of homophony that a generative grammar clarifies by the explicit way in which parts of speech are specified. We will discuss these as we come to them.

We may now expand the symbol $V$:

$$ V \longrightarrow \begin{cases} 
  V_{\text{int}} \\
  V_{\text{tr}} + \text{Nom} \\
  V_{\text{mid}} + \text{Nom} 
\end{cases} \quad (\text{Man}) $$

Rule (6) divides the remaining verbs into three general classes: intransitive verbs ($V_{\text{int}}$), which will be sub-divided in Rule (7); transitive verbs ($V_{\text{tr}}$), which will be sub-divided in Rules (9), (10), and (11), and middle verbs ($V_{\text{mid}}$). $V_{\text{int}}$ and $V_{\text{tr}}$ share an optional adverbial of manner. $V_{\text{tr}}$ and $V_{\text{mid}}$ share a Nom, though only the $V_{\text{tr}}$ has a passive form.

$$ V_{\text{int}} \quad \text{Man} $$

6(a): The boy walked away (rapidly).
(b): The boy hit the ball (hard). (Active)

The ball was hit by the boy. (Passive)

(a): The books cost ten dollars. (Active)

*Ten dollars is cost by the books. (Passive)

V_{tr}  \quad \text{Man}

(d) The boy kissed the girl passionately.

*The books cost ten dollars rapidly.

It seems clear that both intransitive and transitive verbs may always be followed by adverbials of manner. However, the class of middle verbs will require further sub-classification. \textit{Resemble}, for example, is certainly not an absolute transitive for it has no passive:

*His mother is resembled by John.

Yet, it may be followed by some manner adverbials:

John resembles his mother closely.

John resembles his mother intellectually.

but not:

*John resembles his mother quickly.

\[
V_{\text{int}} \quad \Rightarrow \quad \begin{cases} 
V_{i} \\
V_{iL} + \text{Loci} \\
V_{iM} + \text{Moti}
\end{cases} \quad \text{(C)}
\]

Rule (7) expands \( V_{\text{int}} \) into \( V_{i} \)'s, which may have no post-verbal element (He sleeps); \( V_{iL} \)'s, which select adverbs of location (He sat on the house); and \( V_{iM} \)'s, which select adverbs of motion (He ran into the
house). One of the purposes of Rule (7) is to show that there are no such sentences as *He sat into the house, *He stood into the room, and *He lies into the garage. Under certain circumstances intransitive verbs require either adverbs of motion or adverbs of location, but not both, and Rule (7) attempts to indicate that there are such restrictions in the language.

The symbol C appears as an undeveloped symbol in several places in the phrase structure grammar to allow for the possibility of such sentences as the following:

7(a): He stood there blinking.
Crusoe lay there feeling thankful.
John came running.
Joe came to play.

V₁L₁'s and V₂Mᵢ's can frequently take a complement that has its origin in a second kernel sentence. In these cases it is often possible to delete the adverbial that appears between the intransitive verb and the complement:

7(b): He stood (there) blinking.
John came (to our house) feeling happy.
Joe came (to the game) to play.

Terminal strings such as 7(a) may seem obscure at first to one not familiar with the symbology of generative grammar. There are, however, extremely strong reasons for representing number, tense, and complement as symbols in a system. For example, the terminal string:

7(d): the boy sg past stand there C

may be transformed into the derived string

7(e): past the boy sg stand there C?
This yes or no question results from a re-arranging of the elements of the terminal string, a process explicitly described and controlled by the question transformation rule. In short, the transformation rules are applied to terminal strings, not to the final utterances. The past morpheme in this terminal string is replaced by the proper form of the pro-verb do which replaces the orthographically unrepresentable symbol past. Thus the utterance, The boy stood there blinking, transforms finally into Did the boy stand there blinking?

We may now proceed with the development of the phrase structure component of the grammar by examining the expansion of \( V_{tr} \):

\[
(8) \quad V_{tr} \rightarrow \begin{cases} 
V_t \\
V_x + P \\
V_T + C 
\end{cases}
\]

Rule (8) separates transitives with preposition complexes, \( V_x + P \), and transitives which take complements \( V_T + C \), from the other \( V_{tr} \)'s.

\( V_t \)

8(a): The boy hit the ball.

\( V_x + P \)

The boy looked at the girl.

\( V_T + C \)

The boy saw - approaching - his friend.

(The boy saw his friend approaching.)
Since transitive verbs can be transformed into the passive, each sentence in 8(a) must have a passive form:

8(b): The ball was hit by the boy.

The girl was looked at by the boy.

His friend was seen approaching by the boy.

In accordance with Rule (6) each of the sentences in 8(a) could have an adverbial of manner:

8(c): The boy hit the ball (easily).

The boy looked at the girl (intensely).

The boy saw his friend approaching (rapidly).

Each of the sentences in 8(a) could be represented by a tree which would culminate in a terminal string:

8(d): The boy sg past hit the ball sg.

The boy sg past look at the girl sg.

The boy sg past see + C his friend sg.

The last string would become, by transformation:

8(e): The boy sg past see - ing + approach - his friend

which would represent the sentence

8(f): The boy saw his friend approaching.

8(e) bears a certain similarity to the comparable complement constructions generated by the selection of C in Rule (7), which produced the string

8(g): The boy sg past stand there - ing + blink

though 8(g) has no passive.

There are many possible constructions that have their origin in strings containing verbs of the class $V_T + C$. Since their formation
requires a second kernel sentence which is combined with the first by transformation, we shall not examine these complex sentences until Chapter III. The following sentences are illustrative of the variety of structures that may be formed from different sub-classes of $V_T + C$'s.

8(h): I heard John call.
    I asked John to call.
    I found John sleeping.
    I put the car in the garage.
    I called John a fool.
    I painted the house red.
    I knew the house to be red.
    I prevented John from risking his life.

A distinguishing feature of a generative grammar is the ease with which it can account for ambiguities that have a structural origin. If a sentence is ambiguous, a grammar ought to be able to account for the ambiguity. It should be possible to show that it has more than one structural origin, that it is, in fact, ambiguous.

8(i): We kept the car in the garage.

A structural grammarian would have no way to account for the fact that 8(i) may be understood in two ways (either: we kept the car in the garage rather than out of the garage or: we kept the car in the garage but we sold the one parked in front of the house). The first interpretation requires us to regard kept as a $V_T + C$ (We kept - in the garage - the car) and the second requires us to regard kept as a simple $V_T$ and in the garage as a reduced relative clause (We kept the car (which is) in the garage). The two sentences will also produce different passives:

8(j): The car in the garage was kept by us (not the one in the street).
    The car was kept in the garage by us (not in the driveway).
In Rule (9) $V_t$'s are divided into four sub-classes:

$$
\begin{align*}
V_A + \text{Mot} \\
V_B + \text{Prt (Mot)} \\
V_{tiot} \\
V_{tn}
\end{align*}
$$

(9) $V_t \rightarrow \{ V_A + \text{Mot}, V_B + \text{Prt (Mot)}, V_{tiot}, V_{tn} \}$

The $V_A + \text{Mot}$ will be expanded in Rule (10) into verbs that have indirect objects into ($V_{tiot}$: I gave - to John - the ball) and verbs which have adverbials of motion ($V_A + \text{Mot}$: I drove - into the garage - the car). $V_B + \text{Prt}$'s are transitive verbs with particles and are contrasted with $V_x + P$'s transformationally as follows:

$$
\begin{align*}
V_x + P \\
\text{He looked at the girl. } \rightarrow^* \text{He looked the girl at.}
\end{align*}
$$

9(a): He looked at the girl. $\rightarrow ^*$He looked the girl at.

$$
\begin{align*}
V_x + P \\
\text{He flirted with the girl. } \rightarrow^* \text{He flirted the girl with.}
\end{align*}
$$

He flirted with the girl. $\rightarrow ^*$He flirted the girl with.

$$
\begin{align*}
V_B + \text{Prt} \\
\text{He brought up the pop. } \rightarrow \text{He brought the pop up.}
\end{align*}
$$

He brought up the pop. $\rightarrow \text{He brought the pop up.}$

$$
\begin{align*}
V_B + \text{Prt} \\
\text{He put away the books. } \rightarrow \text{He put the books away.}
\end{align*}
$$

He put away the books. $\rightarrow \text{He put the books away.}$

The structure of the kernel grammar must be developed in terms of the relationships that seem to hold between the simple and the complex structures. Consequently, it is always difficult to comprehend individual rules in the grammar without being familiar with the whole grammar. Conversely, it is difficult to understand the character of the whole grammar without knowing the individual rules. It is possible that the steps required to understand the workings of a model are
analogous to the steps the child passes through as he learns his native language. The child must revise his grammar in accordance with the constant corrections he receives from his parents and later from his teachers. This process seems to be a never-ending one, since he is never able to write or speak with the precision and accuracy he desires. In this sense it is misleading to say that the child has acquired virtually full command of the phonology, morphology, and syntax of his language by the age of five or six. The model of language that leads to this supposition can hardly be adequate.

Rule (9) also introduces Vtrans, transitive verbs that have indirect objects in for (I bought a hat for John).

Here again it will be possible to illustrate how the structure of the transformational component of the grammar determines and is determined by the phrase structure rules. The school textbooks customarily observe that there are indirect objects in both to and for, though the grammatical characteristics of these constructions are not examined, and it is not noted that these are discrete classes of verbs, each class containing a rather small number of members. If we follow the general practice of forming the passive by interchanging the subject and the direct object and expanding the verb appropriately, we discover that the two indirect object constructions have the following passives:

9(b): I gave the ball to John. → The ball was given by me to John.

I bought the ball for John. → The ball was bought by me for John.
But if we begin with the alternative form of these sentences:

9(a): I gave John the ball.
     I bought John the ball.

Then the first sentence has two passives:

9(d): John was given the ball (by me).
      The ball was given John (by me).

but the indirect object in for has no passives:

9(e): *John was bought the ball (by me).
      *The ball was bought John (by me).

The generative grammarian must cope with the problems presented by the various acceptable and unacceptable sentences presented above by writing the rules of the grammar in such a way that only the sentences, not the non-sentences, are produced. In the case of the indirect object constructions this can be accomplished by permitting the phrase structure grammar to produce only I gave the ball to John and I bought the ball for John. The indirect object rules that transform I gave the ball to John and I bought the ball for John into I gave John the ball and I bought John the ball are arranged so that the passive transformation may be applied to I gave John the ball but not to I bought John the ball. The procedure for applying the rules may be illustrated by constructing an imaginary machine that not only produces the terminal strings that contain the grammatical elements of kernel sentences but also transforms these terminal strings into all of the grammatical passive forms and none of the ungrammatical forms. In this machine sentence formation begins at the top with the phrase structure rules which produce the terminal strings of kernel sentences and ends at the bottom where only grammatical sentences of English appear as the final
product. The transformational rules may be optionally applied to any appropriate terminal string, though they may be applied only once and only to strings that come from above. In the illustration below A has just produced the two strings (1) and (2).

A. Phrase structure rules

(1) The boy past give to John the book
(The boy gave the book to John.)

(2) The boy past buy the book for John
(The boy bought the book for John.)

B. Indirect object transformation #1 (applies only to $V_{tiof}$'s
followed by to)

C. Passive transformation #1 (applies only to $V_{tr}$'s)

$$
\begin{array}{cccccc}
\text{Nom} & \text{Aux} & V_{tr} & \text{Nom'} & Y \\
1 & 2 & 3 & 4 & 5 \\
\end{array}
$$

Structural Change: $4 + 2 + \text{be-en} + 3 + 5 + \text{(by + 1)}$

(In this rule en is the sign of the past participle and Aux refers to any auxiliary element.)

D. Passive Transformation #2 (applies only to $V_{tiof}$'s)

$$
\begin{array}{cccccc}
\text{Nom} & \text{Aux} & V_{tiof} & \text{Nom'} & Y \\
1 & 2 & 3 & 4 & 5 \\
\end{array}
$$

Structural Change: $4 + 2 + \text{be-en} + 3 + 5 + \text{(by + 1)}$

E. Indirect object transformation #2 (applies only to $V_{tiof}$'s)

Apply B to (1): (3) The boy past give John the book
(The boy gave John the book.)
Apply C to (2): (4) \[ \begin{array}{c}
\text{Nom}^1 \quad \text{Aux} \quad V_{\text{tr}} \quad \text{Nom} \\
\frac{4}{2} \quad \frac{2}{3} \quad \frac{3}{1}
\end{array} \]
\[
(\text{The book was given John (by the boy)).}
\]

Apply D to (3): (5) \[ \begin{array}{c}
\text{Nom}^1 \quad \text{Aux} \quad V_{\text{tiot}} \quad Y \\
\frac{4}{2} \quad \frac{2}{3} \quad \frac{3}{4} \quad \frac{4}{5}
\end{array} \]
\[
(\text{John was given the book (by the boy)).}
\]

Apply C to (1): (6) \[ \begin{array}{c}
\text{Nom}^1 \quad \text{Aux} \quad V_{\text{tr}} \quad \text{Nom} \\
\frac{4}{2} \quad \frac{2}{3} \quad \frac{3}{1}
\end{array} \]
\[
(\text{The book was given to John (by the boy).}
\]

Apply C to (2): (7) \[ \begin{array}{c}
\text{Nom}^1 \quad \text{Aux} \quad V_{\text{tiot}} \quad \text{Nom} \\
\frac{4}{2} \quad \frac{2}{3} \quad \frac{3}{1}
\end{array} \]
\[
(\text{The book was bought (by the boy) for John.)}
\]

Apply E to (2): (8) The boy past buy John the book
\[
(\text{The boy bought John the book.)}
\]

The sentence producing machine has been constructed in such a way that only the grammatically acceptable passive forms can be produced. The unacceptable passive forms for \( V_{\text{tiot}} \)'s cannot be generated because the passive transformation cannot be applied to terminal strings that follow it.

Rule (10), then, is as follows:

\[
V_{A} + \text{Mot} \rightarrow \begin{cases}
V_{A}, + \text{Mot} \\
V_{\text{tiot}} + \text{to} + \text{Nom}
\end{cases}
\]
It will be noticed that just as $V_{tiot}$ + to + Nom is derived from $V_{tr}$, so is $V_{A^1} + Mot^1$. Consequently, the passive form of $V_{A^1} + Mot^1$ will be as follows:

10(a): The boy past drive into the garage the car.  
\[ \begin{array}{llll}
1 & 2 & 3 & 4 \\
\end{array} \]

The car past been drive into the garage (by the boy).  
\[ \begin{array}{llll}
4 & 2 & 3 & 1 \\
\end{array} \]

(The car was driven into the garage (by the boy).)

The same rule that transforms *I gave - to John - the ball* to *I gave the ball to John* will change *The boy drove - into the garage - the car* to *The boy drove the car into the garage.*

$V_{tn}$ in Rule (9) will be further expanded in a later rule into a number of subclasses which include verbs that choose animate subjects, $V_{t1}$; animate objects, $V_{t2}$; animate subjects and animate objects, $V_{t3}$; and finally a class of verbs that may have objects that are nominalized forms of other simple kernel sentences, $V_{t4}$.

Now that the classification of verbs described by this version of the phrase structure grammar has been completed (with the exception of $V_{tn}$, which will be discussed more fully in Rule (29)), it might be helpful to present the classes and sub-classes in the form of a flow chart with $V_D$ as the matrix term. Figure 1 illustrates this.

According to Figure 1, then, it can be seen that a $V_{A^1} + Mot^1$ is a member of the class $V_{A^1} + Mot$, which is a member of the class $V_{t1}$, which is a member of the class $V_{tr}$. Each sub-class clearly has characteristics that distinguish it from other sub-classes of the same class, yet all sub-classes share certain characteristics that identify them as members of the same class. For example, $V_{A^1} + Mot^1$ and $V_{tiot} + to + Nom$...
Figure 1

Verb

Vb

Stay

Remain

Become

VL

V

Vint

Vtr

Vmid

V1

V1L + Loc

V1M + Mot

Vt

Vx + P

VT + C

VA + Mot

VB + Prt

Vtiof

Vtn

VA1 + Mot

Vtiot + to + Nom

Vtl Vt2 Vt3 Vt4
both participate in the passive transformation as members of the $V_{tr}$ class, though $V_A + \text{Mot}$ may be distinguished from the $V_{tlot} + \text{to} + \text{Nom}$ because it does not have two passives. Or again: both $V_x + P$ and $V_T + C$ are $V_{tr}$'s and produce passives in the following way:

The boy past look at the girl
(The boy looked at the girl)
The girl past been look at by the boy
(The girl was looked at by the boy)
The boy past call a fool the girl
(The boy called a fool the girl)
The girl past been call a fool by the boy
(The girl was called a fool by the boy)

Rules (11) - (15) expand the term Adv into a set of terms that account for the simple adverbial constructions, an undeveloped symbol ($\emptyset$), which will provide for the formation of complex S's containing causative adverbial clauses, and a set of undeveloped symbols (LOC, TM, MOT, MAN) which will provide for adverbial clauses of location, time, motion, and manner.

\[
\begin{align*}
(11) \quad \text{Adv} & \quad \Rightarrow \quad \left\{ \begin{array}{l}
\text{for + Nom} \\
\text{Loc} \\
\text{Tm} \\
\emptyset \\
\text{Man} \\
\text{Mot}
\end{array} \right. \\
(12) \quad \text{Loc} & \quad \Rightarrow \quad \left\{ \begin{array}{l}
P_L + \text{Nom} \\
\text{Adv}_L \\
\text{Loc}
\end{array} \right.
\end{align*}
\]
These rules will provide for sentences of the following kinds:

11(a): I am carrying the books for Mary.
John drinks carrot juice for his health.

11(b): I am carrying the books because I like Mary.
John drinks carrot juice because he likes it.

12(a): John sat on the house.
The boy stood on the rug.

12(b): John lives here.
The boy stood there.

12(c): John will be standing where the road turns into the cemetery.

13(a): The boy will leave in the morning.
The work must be done before Tuesday.

13(b): Glass will begin now.
George will come tomorrow.

13(c): You must leave when the bell rings.

14(a): John ran across the yard.
The boy came into the courtyard.

14(b): The boy slipped where the water was spilled.

15(a): You must play the game according to the rules.
She danced with aplomb.
15(b): John ran away quickly.
The girl danced magnificently.

15(c): The boy plays the game however he wants to.

An examination of the first fifteen rules will show that this version of the phrase structure grammar automatically limits the number of adverbial constructions that can appear in a kernel sentence. A sample derivation in which all the possible obligatory and optional adverbial elements are selected will illustrate this. When an optional element is selected, the parentheses will be dropped. When an optional element is not selected, it will not appear in the derivation.

1. S
2. Nom + VP + Adv
3. Nom + aux + MV + Adv
4. Nom + aux + V_b + Adv
5. Nom + aux + V + Adv
6. Nom + aux + V_tr + Nom + Man + Adv
7. Nom + aux + V_t + Nom + Man + Adv
8. Nom + aux + V_b +prt + mot + Nom + Man + Adv
9. Nom + aux + V_b +prt + mot + Nom + Man + for + Nom

The completed phrase structure grammar would produce from the string in step 9 the following pre-sentence:

The boy + should + bring+up + from the basement + the wine + carefully for + his mother.
the elements of which would be re-ordered to produce the following sentence:

The boy should bring up the wine carefully from the basement for his mother.

In this version of the phrase structure grammar, sentences which contain more than the permissible number of simple adverbial constructions would have to be thought of as complex sentences, with the extra adverbial elements coming in by way of transformation.

Rules (16) - (28) develop the Nom. Here again the procedure involves sub-classification (see figure 2). Rule (16) expands the Nom into a noun phrase and \(N^0\), a symbol for number that will later be expanded into singular and plural. Many choices in the production of a sentence require the speaker to be conscious of rules of concord. If the subject Nom is singular and the tense is present, then the verb selects an \(s\) (The boy + pl + pres + sing —— The boy sings). If the subject Nom is plural and tense is present the Nom selects an \(s\) but the verb does not (The boy + pl + pres + sing —— The boys sing). There are also number restrictions; for example, rule (27) describes the restriction on number when the Nom contains a mass noun. It would also be possible (though this version of the grammar does not do it) to indicate the selection of the same number in the predicate as in the subject when the verb is be, become, stay, or remain.

\[
(16) \text{Nom} \rightarrow NP + N^0
\]
Figure 2

```
N
```

```
N_{pr}  N_{com}
```

```
N_{pa}  N_{pl}
```

```
N_{pm}  N_{pf}
```

```
N_{sm}  N_{sf}  N_{sn}
```

```
N_{ont}  N_{m}
```

```
N_{en}  N_{in}
```

```
N_{am}  N_{af}  N_{aN}
```

Rule (17) expands NP into an optional determiner (a, the, his, her, this, that, these, those . . .) an optional c, which provides a slot for dependent clauses and the adjectives that have their origin in dependent clauses, and a noun, N. The c in Rule (17) is not unlike the c in Rule (8) which also provides for complex structures that are a product of more than one kernel sentence. A complete set of phrase structure rules would specify determiner selection restrictions. The following sentences will illustrate a variety of such restrictions:

The boy reads well.
*A boy reads well.
*You will never find the more interesting book than The Trial.
Those boys can read well.
*Bill bought the bigger house than Jim bought.
*John danced with a prettiest girl in the room.
*I'm afraid a milk is sour.
*He was shot through a heart.
*He gives me the pain in a neck.

It seems clear that a simplified version of a grammar could not attend to the subtle complexities governing selection of determiners—especially if the grammar is being designed for possible use with junior high or high school pupils. If a generative grammar of English were being developed for a class learning English as a second language, then determiner selection would be of crucial importance.

\[(17) \text{ NP } \longrightarrow (D) + N + (C)\]

---

Nouns are first of all divided into common and proper:

\[
N_{\text{pr}} \rightarrow \begin{cases} 
N_{\text{nom}} \\
N_{\text{com}}
\end{cases}
\]

Proper nouns are either animate or inanimate:

\[
N_{\text{pr}} \rightarrow \begin{cases} 
N_{\text{pa}} \\
N_{\text{pi}}
\end{cases}
\]

Rule (19) will make it possible to show that John plays golf is a kernel sentence in which the animate noun (John) is selected by the \(V_{\text{tl}}\) (a class of verbs that select animate nouns as subject) and that the deviant sentence Golf plays John is not a kernel sentence, but a sentence that is related to the kernel sentence metaphorically. One reason for calling Golf plays John a deviant sentence is that it can only be understood in terms of the non-deviant sentence John plays golf. The deviant sentence means that John plays so much golf that it is no longer sensible to think of John as a free agent in this matter. The distinction between deviant and non-deviant sentences leads immediately into the discussion of metaphor: personification is a deviant structure in which a verb which customarily selects an animate noun selects an inanimate noun: The brook laughed. The inanimate noun, brook, is in the position of an animate noun, and is consequently personified. Another illustration of a deviant structure is Dylan Thomas's a grief ago which must be understood in terms of the non-deviant structure a year ago (i.e., a + \(N_{\text{tm}} + \text{ago}\)). Grief, which is
an abstract noun, appears in the position customarily occupied by a
time noun. Rule (20) expands animate proper nouns into masculine and
feminine:

\[
(20) \ N_p \rightarrow \begin{cases} N_{pm} \\ N_{pf} \end{cases}
\]

Rule (21) expands \( N_{com} \) into \( N_s \) (noun substitutes) and \( N_o \), a
symbol that is expanded into concrete noun and abstract noun in Rule
(23). Noun substitutes may be either masculine, feminine, or neither
one (Rule (22)).

\[
(21) \ N_{com} \rightarrow \begin{cases} N_s \\ N_o \end{cases}
\]

\[
(22) \ N_s \rightarrow \begin{cases} N_{sm} \\ N_{sf} \\ N_{sn} \end{cases}
\]

\[
(23) \ N_o \rightarrow \begin{cases} N_{con} \\ N_{ab} \end{cases}
\]

Concrete nouns are either countable or uncountable (mass):

\[
(24) \ N_{con} \rightarrow \begin{cases} N_{cnt} \\ N_{m} \end{cases}
\]
Countable nouns are either animate (boy) or inanimate (tree): 

\[
\begin{align*}
(25) \quad N_{\text{cnt}} & \quad \rightarrow \quad \begin{cases} 
N_{\text{an}} \\
N_{\text{in}} 
\end{cases} 
\end{align*}
\]

Animate nouns are masculine (boy), feminine (girl), or neither (student): 

\[
\begin{align*}
(26) \quad N_{\text{an}} & \quad \rightarrow \quad \begin{cases} 
N_{\text{am}} \\
N_{\text{af}} \\
N_{\text{an}} 
\end{cases} 
\end{align*}
\]

Mass nouns are not countable, so the grammar provides a rule which defines this restriction: 

\[
\begin{align*}
(27) \quad N_{\text{m}} & \quad \rightarrow \quad N_{\text{m}} + \text{sg} 
\end{align*}
\]

Rule (27) states that, when mass nouns are chosen, singular number is selected. 

\[
\begin{align*}
(28) \quad N^0 & \quad \rightarrow \quad \begin{cases} 
\text{sg} \\
\text{pl} 
\end{cases} 
\end{align*}
\]

In accordance with some of the distinctions developed in the noun expansion rules, Rule (29) expands \( V_{\text{tn}} \) into four classes: verbs that select animate nouns as subject (\( V_{t1} - \text{thank, admire} \)), verbs that select animate nouns as object (\( V_{t2} - \text{astonish, surprise} \)), verbs that select animate subjects and inanimate objects (\( V_{t3} - \text{alter, complete} \)), and verbs which may have nominalized sentences as objects (\( V_{t4} - \text{know, believe, understand} \)).
In Rule (30), \textit{Prev}, which appears originally as an optional symbol in Rule (1), is expanded into \textit{E}, an emphasis morpheme that produces by transformation such sentences as \textit{he DID go}, which contrasts with \textit{he went}; \textit{not} for negative sentences, and \textit{pvb}, which is either positive or negative (hardly, scarcely, always, sometimes . . .)

\begin{equation}
(30) \text{Prev} \quad \rightarrow \quad (E)(\text{Not})(\text{Pvb})
\end{equation}

When \textit{not} and \textit{pvb} appear together, the \textit{Pvb} must always be positive:

\begin{equation}
(31) \text{not } + \text{Pvb} \quad \rightarrow \quad \text{not } + \text{Pos}
\end{equation}

Otherwise \textit{Pvb} may be either negative or positive:

\begin{equation}
(32) \text{Pvb} \quad \rightarrow \quad \begin{cases} 
\text{Pos} \\
\text{Neg}
\end{cases}
\end{equation}

The auxiliary structure in English is varied and complicated. A surprisingly great portion of it is described in Rule (33):

\begin{equation}
(33) \text{Aux} \quad \rightarrow \quad \text{tns} \begin{cases} 
M \\
(\text{have } + \text{En})
\end{cases} \begin{cases} 
\text{be } + \text{to} \\
(\text{be } + \text{ing})
\end{cases}
\end{equation}

Rule (34) accounts for an exception in which tense must be past (there is no *The boy is to have gone); otherwise tense may be either present or past.
This description is contrary to the customary description borrowed from Latin which clearly has six tenses (vocat, vocabet, vocabit, vocavit, vocaverat, vocaverit). In Latin there is a clear connection between tense (a grammatical concept) and time (a semantic concept). In English, however, this is not true. Verbs customarily have two or three principal parts (go, went, gone; walk, walked; be, was, been), the first of which is the base form which is used with plural nouns in the so-called present tense, with the sign of the infinitive to, with the modal auxiliaries (can, will, shall, would, could . . . ), and with the sign of the present participle -ing; the second principal part is the past form; the third principal part (sometimes the same as the second) is the past participle and is used when have is an auxiliary. Future time is referred to in English in a variety of ways:

I go to school next summer.
I am going to the game tomorrow.
I will go if you want me to.

There is no future tense in English. Attempts to provide paradigms of English verbs modeled after Latin paradigms will not stand up under close scrutiny. It is now customary to say that English has two tenses, present and past. Some grammarians prefer to say that English contains a past and a non-past tense. There is clearly a grammatical form that can be called past, though there is not clearly a form that can be called present, since the present and the base form are identical unless the subject is singular, in which case an s is added to the verb. In this version of the grammar, tense is either present or past.
The use of the hyphen (−) as a concatenation symbol has no other significance than to call attention to certain elements in a rule. In (31), for example, it is the inseparable be+to auxiliary that selects past only in the context of have+En.

The auxiliary rule describes twenty different auxiliary constructions. Tns is obligatory; all other elements are optional. The following constructions are illustrative:

(33) a: The boy pres sing well. (The boy sings well.)
    b: The boy pres be+to sing well. (The boy is to sing well.)
    c: The boy pres have+en sing well. (The boy has sung well.)
    d: The boy pres be+ing sing well. (The boy is singing well.)
    e: The boy pres have+en be+ing sing well. (The boy has been singing well.)
    f: The boy pres M sing well. (The boy will sing well.)

The adj that appears in Rule (4) may be expanded as follows:

(36) Adj ──────> (I)A

The optional I provides for intensifiers (very, quite, extremely, too . . .),

(37) A ──────> \( \begin{array}{c} A_{at} \\ A_p \end{array} \)

Adjectives may be sub-divided into those that may enter the Nom by transformation, \( A_{at} \), and those that must remain in the predicate, \( A_p \).
Adjectives must follow certain rules of co-occurrence, so we distinguish a number of sub-classes which are selected by corresponding classes of nouns.

(38) \( A_{at} \) -----> \( \{ A_{cnt} \} \) \( \{ A_{m} \} \)

(39) \( A_{cnt} \) -----> \( \{ A_{an} \} \) \( \{ A_{in} \} \)

Adjectives selected by animate and inanimate nouns may frequently have complement constructions:

(40) \( A_{an} \) -----> \( \{ \{ A_{x} \} \} \) \( \{ A_{y} \} \) \( \{ A_{z} \} \)

(41) \( A_{in} \) -----> \( \{ A_{y} \} \) \( \{ A_{d} \} \)

Rules (40) and (41) provide for the production of such sentences as the following:

40(a): The man is aware that she goes there. \((A_{x} + C)\)
(b): The man is likely to go. \((A_{y} + C)\)
(c): The man is clever to go. \((A_{z} + \text{infinitival nominal})\)

41(a): The knife is likely to break. \((A_{y} + C)\)
(b): The rules are certain to disappear. \((A_{y} + C)\)
(c): The grass is green. \((A_{d})\)
Predicate adjectives may be sub-divided into animate and inanimate:

\[(42) \ A_p \rightarrow \begin{cases} A_{pa} \\ A_{pi} \end{cases}\]

thus providing for

42(a): The boy was afraid.
(b): The door is ajar.

It is certainly clear that many rules would have to be added to
this version of the phrase structure grammar before it could become an
automatic sentence-generating machine. Such a grammar should include
precisely formulated rules that would prevent the generation of such
non-sentences as the following:

*A boy is the man.
*The boys became a man.
*John cut himself.
*Boy hit the ball.

The rules of this version of the grammar suggest that there are certain
restrictions that govern the production of well-formed sentences, but
many of these restrictions are not stated precisely. A more complete
version of the grammar would provide an explicit description of these
restrictions. This point can be illustrated by producing a representation
(a tree) of the ordered application of the rules (Figure 3).

A tree is formed by applying the rules in order. When all
elements in a rule are obligatory (\(\text{Nom} \rightarrow NP + N^0\)) they must
appear. When an element is optional (\(S \rightarrow \text{Nom} + VP (Adv)\)) it may
be included in the tree, but if it is not chosen it remains in paren-
theses and is not developed. In Figure 3, for example, (D), (O),
(prev), and (Adv) all remain in parentheses and are not developed.
Figure 3

(16) Nom
(17) (D) N (C) (prev) Aux MV
(18) Npr
(19) Npa
(20) Npm

(32) (George is a man.)

(28) George sg pres Be a man sg
Rule (18) selects a proper noun which automatically rules out the selection of a determiner. Since the MV becomes Be + Nom, the N° automatically is the same on both sides of the copula (There is no *The boys is a man). These restrictions are only suggested in this version of the grammar.

Figures 4-7 illustrate in somewhat simplified form a variety of terminal strings in tree form. The sentences that would be produced by applying appropriate transformational rules to the terminal strings are included in parentheses at the bottom of each tree.
The girl past buy a hat for him.

(The girl bought a hat for him.)
(He had given a hat to her.)
(I knew that she sings well.)
(He is never happy.)
### LEXICON

<table>
<thead>
<tr>
<th>Category</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ad</strong></td>
<td>long, short, tall, old, ...</td>
</tr>
<tr>
<td><strong>Am</strong></td>
<td>abundant, plentiful, rare, scarce, ...</td>
</tr>
<tr>
<td><strong>Apa</strong></td>
<td>afraid, nice, happy, sad, ...</td>
</tr>
<tr>
<td><strong>Api</strong></td>
<td>ajar, open, shut, ...</td>
</tr>
<tr>
<td><strong>Ax</strong></td>
<td>glad, certain, sure, ready, happy, afraid, ...</td>
</tr>
<tr>
<td><strong>Ay</strong></td>
<td>apt, liable, certain, sure, ready, ...</td>
</tr>
<tr>
<td><strong>Az</strong></td>
<td>clever, cunning, foolish, shy, smart, wise, ...</td>
</tr>
<tr>
<td><strong>ADV</strong></td>
<td>here, there, ...</td>
</tr>
<tr>
<td><strong>MOT</strong></td>
<td>here, there, ...</td>
</tr>
<tr>
<td><strong>ADV</strong></td>
<td>yesterday, today, tomorrow, now, then, ...</td>
</tr>
<tr>
<td><strong>Loc</strong></td>
<td>a, an, each, one, some, the, this, that, these, those, ...</td>
</tr>
<tr>
<td><strong>I</strong></td>
<td>very, quite, rather, too, ...</td>
</tr>
<tr>
<td><strong>M</strong></td>
<td>can, could, may, might, must, shall, should, will, would</td>
</tr>
<tr>
<td><strong>Nab</strong></td>
<td>assumption, cause, fact, it, idea, notion, plan, problem, reason, ...</td>
</tr>
<tr>
<td><strong>NaF</strong></td>
<td>girl, woman, waitress, hostess, lass, lady, ...</td>
</tr>
<tr>
<td><strong>NaM</strong></td>
<td>boy, man, waiter, host, lad, gentlemen, ...</td>
</tr>
<tr>
<td><strong>NaN</strong></td>
<td>student, teacher, worker, ...</td>
</tr>
<tr>
<td><strong>Nin</strong></td>
<td>tree, table, chair, desk, pencil, ...</td>
</tr>
<tr>
<td><strong>Nm</strong></td>
<td>blood, magic, radium, rice, smoke, ...</td>
</tr>
<tr>
<td><strong>NsF</strong></td>
<td>she, her, I, me, us, you, they, them</td>
</tr>
<tr>
<td><strong>NsM</strong></td>
<td>he, him, I, me, we, us, you, they, them</td>
</tr>
<tr>
<td><strong>NsN</strong></td>
<td>it, them, then</td>
</tr>
<tr>
<td><strong>Neg</strong></td>
<td>hardly, never, scarcely, seldom, ...</td>
</tr>
<tr>
<td><strong>Nom</strong></td>
<td>June, Monday, 1964, ...</td>
</tr>
</tbody>
</table>
N_{pm} John, Mr. Smith, ...
N_{pf} Mary, Mrs. Smith, Miss Jones, ...
N_{pm} Pennsylvania, Ohio, Germany, New York City, Empire State Building, ...
Prep after, at, before, by, during, for, in, near, on, of, over, to, ...
Prep_{Loc} at, in, on, ...
Prep_{Man} by, with, by means of, along with, ...
Prep_{Mot} into, onto, to, ...
Prep_{Tm} on, before, by, after, during, ...
Pos almost, always, often, probably, sometimes, ...
Prt across, away, down, in, out, over, under, up, ...
V_{A} aim (at), drive (into), put (onto), throw (toward), ...
V_{act} get, grow, turn, ...
V_{ap} appear, look, seem, sound, ...
V_{B} bring (up), put (away), take (over), put (through), run (up), ...
V_{i} arrive, bark, behave, perish, shiver, sleep, swim, vanish, ...
V_{il} lie, stand, ...
V_{im} glance, go, look, run, sneak, ...
V_{mid} befall, cost, have, lack, mean, resemble, weigh, ...
V_{s} feel, smell, taste, ...
V_{t1} acknowledge, admire, bribe, find, praise, thank, ...
V_{t2} astonish, please, surprise, terrify, ...
V_{t31} alter, complete, generate, strike, tune, ...
V_{t32} breathe, eat, hammer, read, sew, smoke, steal, write, ...
V_{t411} announce, believe, deduce, discover, forget, guess, imply, infer, imagine, know, ...
| $V_{t412}$ | demonstrate, mean, prove, show, signify, ... |
| $V_{t42}$ | attest to, complain about, find out about, hear about, learn of, testify to, vouch for, ... |
| $V_{t43}$ | convince, inform, persuade, tell, ... |
| $V_{t44}$ | believe, guess, know, say, suppose, think, ... |
| $V_{ti0f}$ | build, buy, choose, get, leave, make, order, save, spare, ... |
| $V_{tiot}$ | give, hand, lend, offer, send, show, ... |
| $V_{Ta}$ | behold, catch, discover, feel, find, hear, keep, leave, notice, observe, overhear, perceive, see, show, smell, watch |
| $V_{Tb}$ | discourage, dissuade, hinder, prevent, save, step (from); coax, coerce, delude, dupe, exasperate, force, frighten, goad, provoke (into); accuse, acquit, cure, suspect (of) |
| $V_{Tc}$ | advise, allow, appoint, ask, authorize, beckon, beg, believe, bid, bribe, cause, caution, choose, command, commission, compel, dare, defy, desire, destine, direct, empower, enable, engage, entice, entreat, exhort, expect, get, help, hire, induce, instruct, intend, invite, lead, leave, mean, need, order, commit, persuade, prefer, press, prompt, provoke, request, require, sentence, summon, teach, tell, tempt, trust, urge, want, warn, wish |
| $V_{Td}$ | consider, declare, judge, know, suppose, suspect; hate, like, love |
| $V_{Te}$ | bid, feel, have, hear, let, make, notice, overhear, see, watch |
| $V_{Tf}$ | appoint, crown, nominate; baptize, call, christen, dub, name; consider, declare, esteem, judge, keep, leave, make, presume, proclaim, pronounce, prove, put, report, see, suppose, think, want, wish. |
| $V_{Tg}$ | color, paint; keep, make, think, suppose, ... |
| $V_{Th}$ | keep, leave, put, ... |
| $V_{in(c)}$ | begin, cease, commence, continue, finish, give up, to, keep, keep on, practice, start, stop, ...; lie, run, stand, ... |
| $V_{x}$ | flirt (with), look (at), object (to), step (on), talk (about), ... |
CHAPTER III

AN INFORMAL PRESENTATION OF THE TRANSFORMATIONS OF ENGLISH

The phrase structure grammar developed in Chapter II will provide an introduction to the formal operations that characterize generative grammar. A formal presentation of a complete generative grammar would also include an ordered set of transformational rules that specify the complex sentences of English and an ordered set of phonological rules that show how strings of symbols are transformed into sequences of sounds. Though it seemed necessary to treat the phrase structure rules formally, with the exception of a few illustrative rules needed to clarify parts of the phrase structure grammar, it seemed desirable to present the transformations of English informally. Any attempt to develop an ordered set of phonological rules would be pedagogically irrelevant in a composition course.

The informal presentation of the transformations of English in this chapter is a revision of the material used with the experimental class as well as a description of the device which was used to analyze the prose samples. Though every effort has been made to eliminate inconsistencies and gross errors, there has been no attempt to adapt the tone or manner of expression to the new audience. Exercises have been omitted.
TYPES OF TRANSFORMATIONS

There are four types of transformations discussed in this chapter: (1) Singulary, (2) Embedding, (3) Conjoining, and (4) Deleting.

1. Singulary Transformations: These are the transformations that are applied to either simple or complex single sentences. Thus a sentence like She watched the baby can be transformed into The baby was watched by her by means of the passive transformation. Similarly, statements may be changed into questions by the question transformation and the complex sentence That we won the game is exciting may be changed into It is exciting that we won the game by the It-inversion transformation. In each case the elements of the original sentence are rearranged and usually new elements are added.

2. Embedding Transformations: These are the transformations by means of which one kernel sentence is embedded in another; the resulting sentence, of course, must be a complex sentence. Each time the embedding transformation is re-applied, the already complex sentence has one more kernel sentence underlying it. For example, the sentence The small boy who always plays in the yard with the high fence borrowed my new bat yesterday is a complex sentence with its origin in six kernel sentences. This grammar identifies thirty-six different embedding transformations, the employment of which reveals significant information about the competence of the writer. Since most of the transformations to be identified are embedding transformations - 36 out of 46 - this chapter will devote its major treatment to embedding transformations.
3. **Conjoining Transformations:** These are the transformations that connect single sentences in a variety of ways; the resulting sentence, again, must be a complex sentence. Thus, *I saw John and I saw Bill* is a complex sentence formed from two kernel sentences: *I saw John/* *I saw Bill*. Many words can be used for conjoining, though the analysis of samples of writing seems to indicate that *and* is used most frequently.

4. **Deleting Transformations:** These are the transformations that enable us to delete certain words from the sentences we have formed. The sentence *I saw John and I saw Bill* was given above as an example of the use of a conjoining transformation. A deleting transformation can remove the second *I saw* to produce the complex sentence *I saw John and Bill*. This sentence is a complex sentence, of course, because its origin still lies in two kernel sentences: *I saw John/* *I saw Bill*.

Transformations are used automatically in sentence production. Some people rely more heavily on one type than on another; or, within one type of transformation, certain transformations are used more frequently than other transformations. With a total of at least forty-six transformations possible in this grammar, it may turn out that we can identify a characteristic way each writer forms his sentences. For example, a second grader may average only two embedding transformations per sentence, whereas a William Faulkner may use as many as thirty per sentence. The particular transformations used, moreover, may also reveal something unique about the individual writer.
EMBEDDING TRANSFORMATIONS

(ET's)

The embedding transformations are used for two main functions: 1) expansion and 2) replacement. Each of the four major parts of speech - N, V, Adj, Adv - may be expanded by means of ET's. Two of the four, the N and the Adv, may also be replaced by ET's. In the phrase structure component of this grammar there were three places where the undeveloped symbol C appeared: in the V + C, in the expansion of NP into D + N + C, and in the expansion of Adj into A + C. If we replace these C's with kernel sentences, we would expand the verb, the noun, and the adjective respectively. Following are some examples of each type of expansion and replacement.

Verb expansion: Nom + V - C - Nom --→ We heard - C - the boy

We heard - shouting - the boy --→ We heard the boy shouting.

In this example heard is a V_T and shouting is a C. This sentence is a complex one because it has its origin in two kernel sentences: We heard - C - the boy / The boy was shouting.

Noun expansion: NP + Be + Adj --→ D + N + C + Be + little --→

The boy - C - is little --→ The boy who is happy is little.

The boy is happy

In this example the C in the NP has been replaced by an S to which the WH transformation has been applied. This sentence is a complex one originating in the two kernel sentences: The boy is little / The boy is happy.

Adjective expansion: He is + Adj --→ He is A + C

He is eager + C --→ He is eager to go.

He goes
Adverb expansion: In the phrase structure component, Adv is rewritten Man + C. The C is replaced with a that + S. Thus:

He ran + Adv
He ran + Man + C
He ran so quickly + C
He ran so quickly + that + S
He ran so quickly that his legs ached.

Noun replacement: N is astonishing. Replace N with That + S. Result: That he won the election is astonishing.

Adverb replacement: The boy goes + Loc. Replace Loc with Where + S. Result: The boy goes where the girls are.

In the phrase structure component, S is rewritten as Nom + VP + φ. The φ can be expanded into a because + S, if + S ...
Thus:
He visited his mother + φ
Expand φ into because + S, She invited him.
Result: He visited his mother because she invited him.

This preview of the Embedding Transformations indicates their general nature. The next section takes up in some detail the thirty-six ET's that help produce sentences of varying complexity.

EMBEDDING TRANSFORMATIONS

Expanding the Nom

One of the most frequently appearing transformations associated with the Nom is the relative clause, which replaces the C attached to the NP. Any two kernel sentences that have a Nom in common may be combined to form a complex sentence containing a relative clause.

That is to say, one kernel sentence is made into a relative clause and then embedded in the other sentence. We call the sentence that is to
be embedded the **Constituent Sentence** and the sentence in which it is embedded the **Matrix Sentence**:

(1) M: The boy has a dog.
   C: The dog is my friend.  ---->  The boy has a dog which is my friend.

(2) M: The boy is happy.
   C: The boy is little.  ---->  The boy who is little is happy.

(3) M: I know the boy.
   C: The boy works hard.  ---->  I know the boy who works hard.

(4) M: I know the boy.
   C: Mary likes the boy.  ---->  I know the boy whom Mary likes.

(5) M: Mary swims in the lake.
   C: Joan swims in the lake.  ---->  Mary swims in the lake that Joan swims in.
   or
   Mary swims in the lake where Joan swims.

To distinguish related but different transformations, it is useful to recognize three kinds of relative clauses. Each of these relative clauses is associated with a different structure. Look closely at the following sets of sentences:

(6) A) M: I know the boy.
   C: The boy is on the window sill.  ---->

   I know the boy who is on the window sill.  ---->
   I know the boy on the window sill.

B) M: I know the boy.
   C: The boy is tall.  ---->

   I know the boy who is tall.  ---->
   *I know the boy tall. (The ** meant "not possible in English.")  ---->
   I know the tall boy.

(7) M: The boy is my friend.
   C: The boy has red hair.  ---->
The boy who has red hair is my friend. ——>
The boy with red hair is my friend.

(8) A) M: The boy is happy.
   C: The boy swims. ——>
The boy who swims is happy.

B) M: The boy is happy.
   C: The boy is swimming. ——>
The boy who is swimming is happy. ——>
The boy swimming is happy. ——>
The swimming boy is happy.

C) M: The boy is flirting with death.
   C: The boy is swimming in a river. ——>
The boy who is swimming in a river is flirting with death. ——>
The boy swimming in a river is flirting with death.

D) M: The boy is wet.
   C: The boy is swimming. ——>
The boy who is swimming is wet. ——>
The boy swimming is wet. ——>
The swimming boy is wet.

If you examine the sentences above carefully, you will discover why they are grouped in three sets. The distinguishing feature, of course, is the verb in the relative clause. In (6) the verb is Be; in (7), have; and in (8), all others. You have probably also noticed that the WH + tns + Be may be deleted, leaving acceptable sentences except where an obligatory transformation is needed to rearrange the word order. Relative clauses containing have can be transformed into a with-phrase, as in (7). The reverse is not true, of course: Not all with-phrases come from relative clauses in have.

Compare these two sentences:

(9) The book with the jacket belongs to Hermione.
Hermione hit the ball with her hand.

Sentence 1 comes from *The book which has the jacket belongs to Hermione*, though sentence 2 does not come from *Hermione hit the ball which has her hand*.

Finally, the sentences (8) contain relative clauses which may have as their verbs any $V_b$. When the aux in the relative clause consists of $\text{tns + Be + ing}$, the $\text{WH-word + Tns + Be}$ may be deleted, and the remainder will be an acceptable sentence. For example, the sentence *The boy who is running down the street is my friend* contains the relative clause who is running down the street; since the aux in this relative clause is $\text{pres + Be + ing}$, the $\text{WH-word + pres + Be}$ (in this case, who is) may be deleted, leaving the acceptable English sentence *The boy running down the street is my friend*. When the deletion of the $\text{WH-word + Tns + Be}$ leaves only the single word verb in the $\text{ing}$ form, this word may be moved to the position between the determiner and the noun. For example, if who is is deleted from the relative clause who is swimming in the sentence *The boy who is swimming is happy*, two additional complex sentences may be formed: *The boy swimming is happy*, or *The swimming boy is happy*.

We can now list our first six Embedding Transformations (ET):

ET-1: Relative Clause (Be)

ET-2: Adjective (by deletion and obligatory placement)

ET-3: Relative Clause (Have)

ET-4: With-phrase

ET-5: Relative Clause ($V_b$)

ET-6: Gerundive Adjective (by deletion and optional placement)
We have now accounted for most of the structures that are said to modify the noun. Presumably, the word modify means in grammatical terms expand, though it is frequently said that adjectives, relative clauses, and deleted clauses alter the meaning of the Nom in some way. It is certainly true that the boy who lives across the street is more definitive than the boy, and it is in this sense that modifiers not only produce more complex grammatical structures but also produce more complex semantical structures.

Before we leave the subject of noun-phrase expansion there are two other structures to consider. When adjectives appear between a D and an N, they may be accounted for in the following way:

(10) The little boy ———> * the boy little ———> 
The boy who is little

It may seem unnecessarily complicated to construct a grammar in such a way that it takes three operations to get an adjective in the proper position. This may be true, though it should be observed that the same set of rules (from kernel sentences to relative clause to deletion of WH + Tns + Be to obligatory placement of the adjective) also accounts for a number of other structures:

(11) The boy (who is) on the corner is my friend.
(12) The boy (who is) standing on the corner is my friend.
(13) The boy (who is) standing is my friend.
(14) The boy standing is my friend.
(15) The standing boy is my friend.
(16) The boy (who is) single is happy.
(17) *The boy single is happy.
(18) The single boy is happy.

You can be sure that a word is an adjective if it will fit in the sequence in (10) or (16)-(18). A gerundive adjective will fit in the sequence (13)-(15). Any word occurring between a D and an N that will not meet the positional requirements of an adjective or a gerundive adjective must, then, be some other kind of word.

Look for example at the following noun phrases:

(19) ... the school teacher --> X teaches school.
(20) ... a bull ring --> X fights bulls in a ring.
(21) ... a station wagon --> X drives the wagon to the station.
(22) ... the boiling point --> X boils at a point.
(23) ... a washing machine --> X is a machine for washing clothes.
(24) ... a night owl --> the owl flies at night.
(25) ... a garden party --> X gave a party in the garden.
(26) ... a book review --> X gave a review of the book.
(27) ... an eating place --> X is a place in which eating is done.
(28) ... a car thief --> The thief steals the car.
(29) ... a fighter plane --> The plane is used to fight X.
(30) ... an artist's model --> the model of an artist --> The artist has a model.
(31) ... the mountain's top --> the top of the mountain --> the mountain has a top.
(32) ... the man's house --> the house of the man --> the man has a house.
We have shown that each of the above structures has a different origin and has to be derived in accordance with the rules of the grammar. However, it would make our stylistic analysis too cumbersome to list a separate rule for each of these structures. Consequently, we will consider (19) through (29) as compounds and (30) through (32) as genitives. We will also consider all of-phrases that can be transformed to the genitive as genitives (the top of the mountain \(\rightarrow\) the mountain's top). We can now add transformational rules 7 and 8.

**ET-7: Compounds**

**ET-8: Genitive**

**Replacing the Nom**

Sentences can be transformed in a number of ways so that they can replace the Nom of a matrix sentence. For some of these nominalization transformations there are a number of restrictions:

1) a nominalized sentence can replace the subject Nom of the matrix sentence only when the verb of the matrix sentence is \(\text{Be} (\text{am, is, are, was, were, has been, have been, had been}), \text{V}_{\text{link}} (\text{appear, look, seem, sound, \ldots}; \text{feel, smell, taste, \ldots}), \text{or} \ V_{t2} (\text{astonish, please, surprise, terrify, \ldots});\)

2) a nominalized sentence can replace a Nom in the VP of the matrix sentence only when that verb is a \(\text{V}_{t41} (\text{announce, believe, discover, forget, guess, imagine, know, notice, perceive, recall, reveal, remember, say, see, suggest, understand, \ldots}; \text{demonstrate, mean, prove, show, signify,} \ldots)\).
(1) M: \(N_{ab} + \) is astonishing.  
  C: He won the fight.  
  \[\rightarrow\]  That he won the fight is astonishing.

(2) M: John knew \(N_{ab}\).  
  C: He won the fight.  
  \[\rightarrow\]  John knew that he won the fight.

(3) M: \(*N_{ab} + \) is green.  
  C: He won the fight.  
  \[\rightarrow\]  \(*That he won the fight is green.\)

From here on, we will use IT as the \(N_{ab}\) in the matrix.

(4) M: IT is incredible.  
  C: He knows something.  
  \[\rightarrow\]  What he knows is incredible.

(5) M: I have forgotten IT.  
  C: He knows something.  
  \[\rightarrow\]  I have forgotten what he knows.

(6) M: \(*IT is rectangular.  
  C: He knows something.  
  \[\rightarrow\]  \(*What he knows is rectangular.\)

(7) M: IT is a problem.  
  C: I should go somewhere.  
  \[\rightarrow\]  Where to go is a problem.

(8) M: I know IT.  
  C: I should go somewhere.  
  \[\rightarrow\]  I know where to go.

(9) M: \(*IT is green.  
  C: I should go somewhere.  
  \[\rightarrow\]  \(*Where to go is green.\)

(10) M: IT is the question.  
    C: I am.  
    \[\rightarrow\]  To be or not to be is the question.

(11) M: Joy arranged IT.  
    C: Joy went.  
    \[\rightarrow\]  Joy arranged to go.
(12) M: *IT is oblong. 
C: I am. 
C: I am not. 

(13) M: IT is exceptional. 
C: He constructs the model rapidly. 

(14) M: *IT is purple. 
C: He constructs the model rapidly. 

When we say that only Nom's containing an \( N_{ab} \) can be replaced by a nominalized sentence, we are introducing the concept of co-occurrence, which is to say that only certain structures can occur with certain other structures. It is under unusual circumstances that such deviancies as the truth is green could be understood. It is possible that the truth is green has certain metaphorical implications, though it is not the task of a grammar to interpret such deviant sentences. We can understand certain deviant structures because we recognize in what way they are deviant. For example, the potential humor connected with Golf plays John is a product of our understanding that Golf plays John is deviant because plays ordinarily must have an animate noun as subject. Your ability to understand the joke in Golf plays John depends on your being able to see the relationship between the deviant sentence Golf plays John and the non-deviant sentence John plays golf. The meaning of the deviant sentence can be understood only in terms of the non-deviant sentence. In general, nominalized sentences can replace only Nom's which contain an \( N_{ab} \); this is a grammatical way of saying that nominalized sentences share certain co-occurrence restrictions.
with abstract nouns. Consequently, such "sentences" as *That he won the fight is green are not produced by the grammar.

We are ready now to examine the structures in which nominalized sentences have replaced the Nom. If a sentence is a representation of a state of affairs, then it is possible to construct a complex sentence in which this state of affairs may be treated in the same way as an abstract noun. Look at the following sentences in which IT takes the place of the Nom to be replaced in the matrix sentence:

(15) IT is true. \[\text{V}_{\text{link}}\] \[\text{That} + \text{I love you} + \text{is true.}\]

(16) IT became certain. \[\text{V}_{t2}\] \[\text{That} + \text{I love you became certain.}\]

(17) IT astonishes me. \[\text{V}_{t41}\] \[\text{That} + \text{I hit the ball astonishes me.}\]

(18) I know IT. \[\text{V}_{t42}\] \[\text{I know} + \text{that} + \text{I love you.}\]

(19) I complained about IT. \[\text{V}_{t43}\] \[\text{I complained (about) that John broke the window.}\]

(20) I told her IT. \[\text{V}_{t43}\] \[\text{I told her} + \text{that} + \text{I love you.}\]

(15) through (17) illustrate the that-clause as a replacement of the subject Nom. (18) through (20) illustrate replacements of Nom's appearing in the VP. In most cases of that-clauses replacing Nom's appearing in the VP, the introductory word that is optionally deletable after most matrix verbs; however, there is a small group of matrix
verbs after which the introductory word that is not deletable:
grieve, rejoice, . . . For example,

I know that you see me. \(\longrightarrow\) I know you see me.

but no: I rejoice that you see me \(\longrightarrow\) *I rejoice you see me.

We now add rules 9, 10a, and 10b:

ET-9: That + S as subject
ET-10a: (That) S as object
ET-10b: That + S as object

Sentences to which the WH-transformation has been applied may also replace NOM's in the same way.

(21) M: IT is interesting.
    C: He knows something. \(\longrightarrow\) What he knows is interesting.

M: IT seems miraculous.
    C: He knows something. \(\longrightarrow\) What he knows seems miraculous.

M: IT astonishes me.
    C: He knows something. \(\longrightarrow\) What he knows astonishes me.

(22) M: I understand IT.
    C: He knows something. \(\longrightarrow\) I understand what he knows.

M: I complained about IT.
    C: He knows something. \(\longrightarrow\) I complained about what he knows. (Notice that the P is not deletable.)

M: I told her IT.
    C: He was the president. \(\longrightarrow\) I told her who he was.

If you explore the possible combinations of WH + S and matrix sentences containing \(V_{t41}, V_{t42}, \) and \(V_{t43} + \text{Nom}\), you will find that there are certain \(\text{WH} + S'\)'s that will not work. For example, it is impossible to say *I believe when he went, though I believe that he went is possible. Presumably a fully developed generative grammar would contain rules
that would not permit the first sentence to be produced, and, in fact, this is the case with the grammatical set of rules that the native speaker uses to produce any of the infinite number of sentences he is potentially able to utter. For our purposes, however, it is not necessary to construct a complete generative grammar—even if that were possible—for our goal is to recognize how sentences that have been produced were produced. As stylistic analysts we must be able to reconstruct the transformational history of each complex sentence we examine. It will not be necessary to reconstruct sets of formalized rules in which all the restrictions are accounted for.

We can now add rules 11 and 12:

ET-11: WH + S as subject
ET-12: WH + S as object

The next two rules involve sentences containing infinitives (to go, to have gone, to laugh, to play, to have joined) which follow WH-words. Sentences like I know where to go and Where to go is obvious seem to be derived in some way from sentences involving WH + S as subject (ET-11) and WH + S as object (ET-12). For example, look at the following sentences:

(23) IT is obvious. I should go there. \[\rightarrow\] Where I should go is obvious. \[\rightarrow\] Where to go is obvious.

(24) I know IT. I should go there. \[\rightarrow\] I know where I should go. \[\rightarrow\] I know where to go.

We now add two new rules:

ET-13: WH + Infinitive as subject
ET-14: WH + Infinitive as object
There are also certain restrictions that seem to apply to the WH +
**Infinitive** constructions that do not apply to That + S or WH + S. In
order to become familiar with these constructions, it would be helpful
to construct as many examples as possible, indicating by an asterisk
(*) which constructions are non-sentences.

The next rule involves the infinitive in sentences like This is
the man to know. and The date to remember is his birthday. These
sentences seem to be derived from:

(27) This is the man.
I should know the man. 

(28) The date is his birthday.
I should remember the date.

It appears that in the constituent sentences the Nom + should + Vb is
transformed into for + Nom + Infinitive. It also seems that the
for + Nom must be deleted when the Nom is I or me, or when the Nom is
identical to one in the matrix. For example,

(29) This is the man.
You should know the man.

(30) The date is his birthday.
You should remember the date.

(31) He had a definite call.
He should preach.
We now add this new rule: ET-15: Nominal Infinitive of Obligation.

Another rule involving the infinitive is illustrated in these sentences: To sing in the chorus is fun. For him to sing in the chorus is fun; To run fast is exciting. For him to run fast is exciting; To write letters is a nuisance. For us to write letters is a nuisance; To play games at a party is great fun. For us to play games at a party is great fun. These sentences seem to be derived as follows:

(32) IT is fun.  For me to sing in the chorus is fun.  To sing in the chorus is fun.
     I sing in the chorus.  ------>  ------>  ------>

(33) IT is fun.  For us to sing in the chorus is fun.  but no:  *To sing in the chorus is fun.
     We sing in the chorus.  ------>  ------>

(34) IT is exciting.  For me to run fast is exciting.  To run fast is exciting.
     I run fast.  ------>  ------>

(35) IT is exciting.  For him to run fast is exciting. but no:  *To run fast is exciting.
     He runs fast.  ------>  ------>

(36) IT is a nuisance.  For me to write letters is a nuisance.  To write letters is a nuisance.
     I write letters.  ------>  ------>  ------>

(37) IT is great fun.  For me to play games at a party is great fun.  To play games at a party is great fun.
     I play games at a party.  ------>  ------>  ------>

(38) IT is great fun.  For us to play games at a party is great fun. but no:  *To play games at a party is great fun.
     We play games at a party.  ------>  ------>

It seems apparent that the Nom + Vb in the constituent sentence can be transformed into for + Nom + Infinitive, and if the Nom is I or me
the for + Nom can be deleted, producing a second complex sentence. We now add a new rule to the list:

ET-16: (For + Nom) Infinitive as subject.

Still another rule involving the infinitive is illustrated in these sentences: He forgot to call her, I wanted to meet him, I tried to answer the questions correctly, and I meant to call you last night. These sentences seem to be derived as follows:

(39) He forgot IT. He called her. ——> He forgot to call her.

(40) I wanted IT. I met him. ——> I wanted to meet him.

(41) I tried IT. I answered the questions correctly. ——> I tried to answer the questions correctly.

(42) I meant IT. I called you last night. ——> I meant to call you last night.

Other verbs which can take the infinitive as object as a replacement for IT in the matrix sentence include: ache, afford, agree, aim, appear, arrange, ask, aspire, attempt, bear, beg, begin, care, chance, choose, claim, combine, commence, condense, consent, conspire, continue, contrive, dare, decide, decline, design, deserve, destine, endeavor, expect, fail, forget, get, happen, hate, have, hesitate, hope, intent, learn, like, love, manage, mean, need, neglect, offer, prefer, presume, pretend, promise, propose, prove, refuse, remember, seek, seem, serve, start, strive, tend, think, threaten, try, undertake, venture, volunteer, want, and wish.

We now add a new rule to the list of NOM replacement transformations:

ET-17: Infinitive as Object.
There are four additional nominalizations that belong in this group: (1) infinitival of purpose; (2) gerundive nominal; (3) gerundive nominal of purpose; and (4) abstractive nominal.

The infinitival of purpose differs somewhat from the infinitive object of the verbs in the section we have just finished.

Examine the following sentences:

(43) The boy began + IT. The boy hit the ball. 

(44) The man made the toy for IT. The man plays with the toy. 

(45) The dog started + IT. The dog ran.

(46) The lesson is designed for IT. The lesson helps you.

(47) We wanted IT. We came to the party.

(48) He bought the car for IT. He drives the car to work.

(44), (45), and (48) contain infinitivals of purpose, as can be seen by the phrase for + IT in the matrix sentence of each of these examples. In addition, each of the complex sentences in (44), (46), and (48) may be transformed into questions in WHY or WHAT FOR, where the answers will be the infinitival phrase.

(49) Why did the man make the toy? To play with.

(50) What is the lesson designed for? To help you.
(51) Why did he buy the car? To drive to work.

However, the complex sentences in (39), (41), and (43)—which contain infinitival complements after the verb—may not be transformed into questions in WHY or WHAT FOR which will produce the infinitival phrase as the answer:

(52) *Why did the boy begin? *To hit the ball.
(53) *Why did the dog start? *To run.
(54) *Why did we want? *To come to the party.

We now add a new rule to our list of NOM replacement transformations:

ET-18: Infinitival of Purpose

The gerundive nominal is a somewhat infrequently used construction. Even so, it does appear, and if our analyses are to be complete we must include as many rules as necessary. Examine the following sentences:

(55) IT surprised us.
He draws pictures rapidly. ——> His rapid drawing of the pictures surprised us.

(56) I approved of IT.
He went. ——> I approved of his going.

(57) IT annoyed his mother.
He went to the party. ——> His going to the party annoyed his mother.

(58) I objected to IT.
Tom complains continuously. ——> I objected to Tom's continuous complaining.

(59) I heard about IT.
John had stolen a new car. ——> I heard about John's having stolen a new car.

The formation of the gerundive nominal from a constituent sentence seems to require the following changes:

1) the change of the Ns-subject to the appropriate determiner (he—> his, she—> her, I—> my, . . .), or the change of the NOM-subject
to its genitive (ET-8) form (Mary—→ Mary's, Jack—→ Jack's, the man—→ the man's, the girl—→ the girl's);

2) the change of the Vb to the -ing + Vb form (Note: some gerundive nominals also have an additional -al + Vb form which is derived from the -ing + Vb form; for example: Howard arrives—→ Howard's arriving—→ Howard's arrival; He peruses the book.—→ His perusing of the book—→ His perusal of the book.);

3) the change of the Nom-object following Tns + Vtr into the periphrastic genitive (ET-8) of + the + Nom-object (following Tns + have + en + Vtr, however, the Nom-object does not change form at all, but follows in its original form the -ing + have + en + Vtr form of the verb.);

4) the change of Adj + ly (if it occurs in the constituent) to Adj and its obligatory placement between the determiner (or -s genitive) and the -ing form of the verb;

5) the retention of any Adv element (Loc, Mot, Tu, or Man (other than Adj + ly)) in its original form following the verb or verb + complement. Like the infinitive, the gerundive nominal may appear as a purposive:

(60) I have a technique for IT. —→ I have a technique for organizing facts.

(61) I have a talent for IT. —→ I have a talent for rapidly painting sunsets.

(62) I have a knack for IT. —→ I have a knack for getting into trouble.
When it appears as a purposive, the gerundive nominal:

1) does not change the Ns-subject into the appropriate determiner
   nor does it change the Nom-subject into the -'s genitive, but
   instead deletes the Ns or Nom entirely;

2) does not change the Nom-object after Tns + V_tr into of + the +
   Nom-object, but instead retains it in its original form;

3) does not change any Adj + ly in the constituent to Adj, but in­
   stead retains it in the original form, though its position as
   Adj + ly may be immediately before the -ing form of the verb or
   immediately after the transformed constituent.

We now have two new rules to add to the list of NOM replacement
transformations:

ET-19: Gerundive Nominal.

ET-20: Gerundive Nominal of Purpose.

The final construction in the section dealing with Nom re­
placement transformations is the abstractive nominal. This structure
has its origin in a complex sentence in which an A + C is expanded
into an Adj + Infinitive. The Adj + Infinitive is then nominalized:

(63) The man is reluctant to go —→ The man's reluctance to go . . .

and inserted into an IT-slot in a waiting matrix sentence like:

(64) I admired IT.

to produce a new complex sentence:

(65) I admired the man's reluctance to go.
It will be noted that the Nom in the constituent sentence containing the Adj + Infinitive is transformed into its genitive form (-'s), that the Adj is transformed into a Nom ending in -ance, and that the Infinitive is retained in its original form but now follows the Nom ending in -ance. It would be well to note that if the Nom had been an Ns, the Ns would have been transformed into the appropriate determiner (he--- his, she--- her, I--- my, . . .) and that there are endings other than -ance for the nominalized adjective (-ness, -ence, -ity being some other common nominalized adjective endings). For example:

(66) IT surprised me. He was eager to depart. ———> His eagerness to depart surprised me.

where He becomes His and the nominalized adjective form of eager is eagerness. Some of the adjectives in class $A_2$ (careful, clever, correct, ignorant, nasty, noble, prudent, sensible, silly, smart, (un)-wise, wasteful, . . .) may be used in this construction, though many of these adjectives do not have a nominalized form.

We now conclude our description of Nom replacement transformations with the addition of this rule:

ET-21: Abstractive Nominal.

Expanding the Adj

The procedure for expanding the adjective is quite similar to that for the noun. Just as the $C$ in the NP node provided for the embedding of the relative clause, the undeveloped $C$ in the Adj node
provides for the expansion of the adjective. Examine the following tree:

The A in this tree may be any of a number of adjectives that can have complements. Look at the following sentences:

(67) The boy is eager + C. \(\longrightarrow\) The boy is eager to go.

(68) My friend is happy about + C. \(\longrightarrow\) My friend is happy about coming to visit me.

(69) George is tired of + C. \(\longrightarrow\) George is tired of sleeping late.

(70) He is free + C. \(\longrightarrow\) He is free to go to school.

(71) I am happy + C. \(\longrightarrow\) I am happy that George left the room.

(72) George is tired of + C. \(\longrightarrow\) *George is tired (of) to sleep late.

(73) He is impatient for + C. \(\longrightarrow\) *He is impatient for going to the show.
There are three structures here that will concern us: \textit{Adj + Inf}, \textit{Adj + gerundive}, and \textit{Adj + that clause}. Not all adjectives can appear in all three structures, as the examples illustrate. We may add these three rules:

\begin{itemize}
  \item ET-22: Adjective + Inf
  \item ET-23: Adjective + that clause
  \item ET-24: Adjective + Gerundive
\end{itemize}

**Expanding the verb**

In the generative grammar, there are several types of \underline{V_{tr}}'s and \underline{V_{in}}'s which carry with them an \textit{obligatory C}, the undeveloped symbol which provides for the expansion of the term to which it is attached.

So far in this manual, we have found the C attached to \underline{Nom}'s (providing for relative clauses ET-1, 3, 5) and adjectives (providing for infinitival, gerundive, and that-clause complements: ET-22, 23, 24). We now examine closely the expansion of certain transitive and intransitive verbs which require the development of an obligatory C from a second constituent sentence. The complement (C) can be a number of things, depending on the type of \underline{V_{tr}} or \underline{V_{in}} chosen. The following sentences are examples of the \underline{V_{tr}}'s and \underline{V_{in}}'s we will examine.

(74) I caught him stealing the money. (\underline{V_{tr}} taking a telescoped progressive)

(75) She prevented her brother from ruining his life. (\underline{V_{tr}} taking a preposition and an -ing phrase nominalization.)

\[ \underline{V_{to}} C \]

(76) I advised Tom to study for the test.

\[ \underline{V_{to}} C \]

(77) I considered him to be my friend. (\underline{V_{tr}} taking an infinitive complement derived from constituent sentence in which Aux = Tns)
In each of the example sentences, we have a complex sentence in which C has its origin in a constituent kernel sentence. For example, the two kernel sentences underlying (74) are I caught + C him and He was stealing the money, while the two kernel sentences underlying (84) are She ran + C down the hall and She was screaming.

Let us take up the examination of the various types of VT's and Vin's individually. English verbs of the type VT + C take a nominal object and an -ing complement derived from a constituent sentence whose MV is progressive (i.e., BE + ING has been selected from Aux). The constituent sentence must also contain as nominal subject a Nom identical to the object Nom in the matrix sentence. For example:

M: I caught + C him.
C: He was stealing the money. ----> I caught him stealing the money.
In the constituent sentence, the Nom subject (He) is identical to the Nom object in the matrix (him), and the MV of the constituent has as part of its Aux BE + ING (was stealing). These \( V_{Ta} + C \) verbs are said to take a telescoped progressive complement (i.e., the constituent sentence containing an MV with a progressive Aux has been collapsed (like a telescope) into \( \text{ING} + \text{MV} + \text{X} \), and this telescoped progressive remnant of the constituent now replaces the C in the matrix sentence).

\( V_{Ta} + C \) verbs taking a telescoped progressive complement include the following: BEHOLD, CATCH, DISCOVER, FEEL, FIND, HEAR, KEEP, LEAVE, NOTICE, OBSERVE, OVERHEAR, PERCEIVE, SEE, SHOW, SMELL, WATCH. We now list our first verb expansion transformation rules:

ET-25: \( V_{Ta} + C \), where \( C = \text{telescoped progressive complement} \).

Another class of \( V_{Tb} + C \) verbs, \( V_{Tb} + C \), takes a nominal object and a complement consisting of a preposition and an -ing phrase derived from a constituent kernel sentence. For example:

\[
\begin{align*}
M: & \quad \text{She prevented from} + C \text{ her brother.} \\
C: & \quad \text{Her brother ruined his life.} \quad \rightarrow \quad \text{She prevented her brother from ruining his life.}
\end{align*}
\]

It should be noted that the nominal object in the matrix sentence (her brother) is identical to the nominal subject in the constituent sentence (Her brother). Further, it should be observed that, unlike the telescoped progressive \( V_{Ta} + C \) verbs whose constituent sentence has an MV in the progressive form, this class of \( V_{Tb} + C \) verbs chooses a constituent whose MV is not in the progressive form. This explains the fact that there are constituent sentences whose MV's cannot be in the progressive form, but which yet provide complements for \( V_{Tb} + C \).
verbs. For example, I accused him of knowing her has as its underlying constituent sentence He knew her, not *He was knowing her. Furthermore, complements after \( V_{\text{to}} + C \) verbs like accuse of may contain Aux elements not to be found in simple progressive sentences. The sentence I accused him of having written the letter has as its underlying constituent sentence He had written the letter, not *He was having written the letter. These \( V_{\text{to}} + C \) verbs include the following: DISCOURAGE FROM, DISSUADE FROM, HINDER FROM, PREVENT FROM, SAVE FROM, STOP FROM: COAX INTO, COERCER INTO, PROVOKE INTO: ACCUSE OF, ACQUIT OF, CURE OF, SUSPECT OF. We now add our second verb expansion transformation rule to the list:

ET-26: \( V_{\text{to}} + C \), where \( C = \text{preposition plus -ing phrase} \).

Another large class of \( V_{\text{to}} + C \) verbs--\( V_{\text{to}} + C \)--takes a nominal object and an infinitive complement--TO plus verb stem (to go, to play, to run, ...). For these, the constituent sentence which furnished the infinitive complement seems to require the MV to be preceded by the auxiliary BE + TO, where the TO is retained in the complement after the BE word has been deleted. For example:

M: I advised + C Tom  
C: Tom is to study for the test. \( \rightarrow \) I advised Tom to study for the test.

It should be noted that, like the \( V_{\text{to}} + C \) and the \( V_{\text{to}} + C \) verbs, the nominal object (Tom) in the matrix sentence is identical to the nominal subject (Tom) in the constituent sentence. Because the auxiliary BE + TO seems to convey a semantic sense of futurity in English, and since the nominal subject and the BE word in the constituent seem to be deleted as part of the process of creating the
complement to fill the C position in the matrix sentence, this construction has been called the **telescoped future**. However, to distinguish it from the next class of $V_T + C$ verbs, we might better describe $V_T + C$ verbs as those taking an **infinitive complement** derived from a constituent in which Aux is BE + TO. These verbs may be referred to, however, as **telescoped futures**, since that term is considerably shorter than infinitive complements derived from constituents in which Aux is BE + TO. The $V_T + C$ verbs include the following: ADVISE, ALLOW, APPOINT, ASK, AUTHORIZE, BECKON, BEG, BELIEVE, BID, BRIBE, CAUSE, CAUTION, CHOOSE, COMMAND, COMMISSION, COMPEL, DARE, DEFY, DESIRE, DESTINE, DIRECT, EMPower, ENABLE, ENGAGE, ENTICE, ENTREAT, EXHORT, EXPECT, GET, HELP, HIRE, INDuce, INSTRUCT, INTEND, INVITE, LEAD, LEAVE, MEAN, NEED, ORDER, COMMIT, PERSuade, PREFER, PRESS, PROMPT, PROvoke, REQUEST, SENTENCE, SUMMON, TEACH, TELL, TEMPT, TRUST, URGE, WANT, WARN, WISH. We now add a third transformation rule to our list of verb expansion rules:

**ET-27**: $V_T + C$, where C = an infinitive complement derived from a constituent in which Aux is BE + TO.

There is another class of $V_T + C$ verbs which resemble the $V_T + C$ verbs. For example, I hated for him to do that and I considered him to be my friend appear to be the same construction as I advised Tom to study for the test; each of these examples has verbs which are followed by a nominal object and an infinitive complement. However, the derivation of the first two examples differs from the derivation of the third example ($V_T + C$ verb) in the choice of constituent sentences which provide the infinitive complement. While
$V_{Tc} + C$ verbs take constituent sentences with the $BE + TO$, HATE and CONSIDER take constituent sentences which have only Tns as auxiliary.

For example:

M: I considered + C him.  
C: He is my friend.  \(\rightarrow\) I considered him to be my friend.

and

M: I hated + C him.  \(\rightarrow\) I hated for him to do that.
C: He did that.

The constituent sentence of I considered him to be my friend is He is my friend, not He is to be my friend; similarly, the constituent sentence of I hated for him to do that is He did that, not He was to do that. This group of verbs—$V_{Th} + C$—can be thought of as taking an infinitive complement derived from constituents in which Aux is Tns to distinguish them from $V_{To} + C$ verbs which require constituents having $BE + TO$ as Aux. These $V_{Th} + C$ verbs include the following: HATE, LIKE, LOVE, (general); CONSIDER, DECLARE, JUDGE, KNOW, SUPPOSE, SUSPECT (copular). The $V_{Th} + C$ group labeled general may take any constituent sentence in which Aux is Tns to provide the infinitive complement, while the $V_{Th} + C$ group labeled copular require the constituent $V$ to be BE. We now add our third verb expansion transformation rule to the list:

ET-28: $V_{Th} + C$, where C = an infinitive complement derived from a constituent sentence in which Aux = Tns.

Another class of $V_T + C$ verbs—$V_{Te} + C$—is followed by a nominal object and an unmarked infinitive complement derived from a constituent sentence. The term unmarked infinitive refers to a tenseless verb-phrase having neither TO nor -ING added (GO rather than TO
GO or GOING, PLAY rather than TO PLAY or PLAYING, . . .). This class
of $V_Te + C$ verbs is small in number, but most of them are quite com-
mon and include the following: BID, FEEL, HAVE, HEAR, LET, MAKE,
NOTICE, OVERHEAR, SEE, WATCH. For example:

M: The teacher let + C me.  
C: I brought my notes to class.  ---->  The teacher let me
bring my notes to class.

and

M: I saw + C him.    ---->  I saw him do it.
C: He did it.

and

M: She made + C him.    ---->  She made him lose his job.
C: He lost his job.

In each of these examples, the nominal object in the matrix sentence
is identical with the nominal subject in the constituent; it should
be noted that instead of the infinitive form of the constituent verb
making up the complement in the complex sentence, only the base form
appears; i.e., BRING rather than TO BRING, DO rather than TO DO, and
LOSE rather than TO Loose. It is the appearance of BRING, DO and LOSE,
rather than TO BRING, TO DO, and TO LOSE, that gives us the term un-
marked infinitive. Further evidence that the complement form is the
infinitive form of the constituent verb is the reappearance of the TO
in the passive transformation of some of the complex sentences formed
by $V_Te + C$ verbs; for example, the passive of I MADE HIM PLAY THE
PIANO FOR US. is not *HE WAS MADE PLAY THE PIANO FOR US., but HE WAS
MADE TO PLAY THE PIANO FOR US. We now add a fourth verb expansion
transformation rule to the list:

ET-29: $V_Te + C$, where C = an unmarked infinitive complement
derived from a constituent sentence.
A number of \( V_{TF} + C \) verbs require a copular constituent sentence to be telescoped to provide the complement in the complex sentence. This means that these verbs require the nominal object of the matrix sentence to be identical with the nominal subject of the constituent sentence and also require the \( MV \) in the constituent sentence to be copular (BE + Pred). For example:

M: He called + C me. \( \longrightarrow \) He called me a fool.
G: I am a fool.

and

M: He appointed + C John.
G: John is the captain. \( \longrightarrow \) He appointed John captain.

The constituent sentence in both examples is telescoped; that is, the nominal subject and the BE word is deleted and only the \( \text{Pred} \) element becomes the complement in the complex sentence. It may also be observed that after \( V_{TF} + C \) verbs like APPOINT that the determiner preceding the nominal in the \( \text{Pred} \) is deleted also. The constituent sentences for this \( V_{TF} + C \) class of verbs are a very specifically determined set: for verbs like APPOINT, CROWN, NOMINATE, the constituent \( \text{Pred} \) is a military, political, or group title; for verbs like BAPTIZE, CHRISTEN, DUB, NAME, the constituent \( \text{Pred} \) is a proper name; the rest of the verbs taking a telescoped copular \( \text{Pred} \) as complement may take more generally defined copular constituents: these verbs include CALL, CONSIDER, DECLARE, ESTEEM, JUDGE, KEEP, LEAVE, MAKE, PRESUME, PROCLAIM, PRONOUNCE, PROVE, PUT, REPORT, SEE, SUPPOSE, THINK, WANT, WISH. We now add a fifth verb expansion transformation rule to the list:

ET-30: \( V_{TF} + C \), where \( C = \) a telescoped copular constituent sentence.
The next class of $V_T + C$ verbs—$V_{tg} + C$—requires, like the other $V_T + C$ verbs, that the nominal object in the matrix sentence be identical to the nominal subject in the constituent; however, the MV in the constituent sentence must be $BE + Adj$ to provide the telescoped adjective complement in the resulting complex sentence. For example:

M: I painted + C the house. $\rightarrow$ I painted the house white.
and
M: The sun kept + C us. $\rightarrow$ The sun kept us warm.

As in other telescoped constructions, you will notice that the nominal subject and the BE word are deleted, leaving only the Adj to provide the complement. These $V_{tg} + C$ verbs include the following: CHURN, COLOR, DISCOVER, FIND, GET, KEEP, MAKE, PAINT, SHOW, SPIN, TURN, WORK.

We now add a sixth verb expansion transformational rule to the list:

ET-31: $V_{tg} + C$, where $C$ = a telescoped adjective complement derived from a copular constituent in $BE + Adj$.

The final class of $V_T + C$ verbs—$V_{th} + C$—presents a somewhat special problem. Looking at (81) again (I put the car in the garage), you might wonder why in the garage could not simply be a Loc in a kernel sentence. Look closely at these three sentences:

(85) They hit the boy on the head.
(86) They admired the book on the shelf.
(87) They put the car in the garage.

In each case we have what appears to be a kernel sentence in which a Loc has been optionally chosen. If this is so, then the Loc could be deleted and we would have an acceptable kernel sentence. When we attempt to do this, we get:

(88) They hit the boy.
(89) They admired the book.
but not *\((90)\) *They put the car.

Whenever a Nom is followed by a prepositional phrase, such as on the head, on the shelf, in the garage, it is always possible that the prepositional phrase had its origin in another kernel sentence and is replacing a \_\_\_ in a kernel matrix sentence. For example:

M: They put + C the car.  \(\rightarrow\)  They put the car in the garage.

C: The car is in the garage.  \(\rightarrow\)  They put the car in the garage.

You will notice that the nominal object in the matrix sentence is identical to the nominal subject in the constituent sentence and that like other telescoped constructions, the nominal subject and the BE word in the constituent are deleted, leaving the Loc prepositional phrase to become the complement in the complex sentence. These \(V_{Th} + C\) verbs which take a telescoped Loc complement seem to be few in number: KEEP, LEAVE, PUT. We now add a seventh verb expansion transformational rule to the list:

\(ET-32: V_{Th} + C, \text{ where } C = \text{a telescoped Loc complement derived from a constituent sentence in } BE + Loc.\)

The last set of verbs which take complements derived from a constituent sentence are the \(V_{in} + C\) verbs. In HE ENJOYED SWIMMING, SWIMMING is a nominalization of a constituent sentence HE SWIMMS, derived from the ET-19 gerundive nominal transformational rule:

M: He enjoyed it.  \(\rightarrow\)  He enjoyed swimming.

C: He swims.

However, in HE KEPT SWIMMING, SWIMMING is a verbal complement derived from a constituent sentence HE WAS SWIMMING in the following manner:

M: He kept + C.  \(\rightarrow\)  He kept swimming.

C: He was swimming.
There are several reasons for this careful distinction between HE ENJOYED SWIMMING (a Nom replacement by nominalization of the constituent sentence by ET-19 rule) and HE KEPT SWIMMING (a verb expansion by telescoping the nominal subject and the BE word of the constituent sentence by ET-33 rule, yet to be developed). First, there is a pronominal expression associated with HE ENJOYED SWIMMING, namely, HE ENJOYED IT; however, HE KEPT IT is not the pronominalized partner of HE KEPT SWIMMING. Second, there is a passive transformation possible with HE ENJOYED SWIMMING, namely, SWIMMING WAS ENJOYED (BY HIM); there is no such passive transformation of HE KEPT SWIMMING, namely, no SWIMMING WAS KEPT (BY HIM). Therefore, the -ING phrase after ENJOY must clearly be interpreted as a nominalized noun replacement, and the -ING phrase following KEEP must just as clearly be interpreted as an intransitive verb complement. These $V_{in} + C$ verbs taking an -ING complement include the following: BEGIN, CEASE, COMMENCE, CONTINUE, FINISH, GIVE UP, KEEP, KEEP ON, PRACTICE, START, STOP; LIE, RUN, STAND, ... We now add the final verb expansion transformational rule to the list:

ET-33: $V_{in} + C$, where $C$ = an -ING complement derived from a constituent Mv in the progressive (BE + ING) form.

This completes our discussion of verb expansion transformational rules. As a quick means of summarizing these various structures, we now list all of them below with an example of a complex sentence produced by each rule.

ET-25: $V_{Ta} + C$ (telescoped progressive: I caught her leaving the room.)
ET-26: $V_{Tb} + C$ (preposition with an -ing phrase: I stopped her from leaving the room.)

ET-27: $V_{Tb} + C$ (telescopied future: I told her to leave the room.)

ET-28: $V_{Td} + C$ (infinitive complement derived from constituent sentence in which Aux = Tns: I knew her to be my enemy.)

ET-29: $V_{Te} + C$ (unmarked infinitive complement: I made her leave the room.)

ET-30: $V_{Tf} + C$ (telescoped copular constituent: I named her chairman.)

ET-31: $V_{Tg} + C$ (telescoped adjective complement: I made her angry.)

ET-32: $V_{Th} + C$ (telescoped Loc complement: I put the book on the shelf.)

ET-33: $V_{in} + C$ (telescoped -ing complement: She stood there crying.)

Replacing the Adverb

In the kernel grammar Loc, Tm, Man, and Mot may be optionally selected as a part of $MV$ and obligatorily chosen after certain intransitive verbs ($V_{il} +$ Loc, $V_{im} +$ Mot). For example, we may have:

(88) He hit the ball (over the fence).

(89) He stood there (in the corner).

(90) He ran (across the field).

(91) He threw the ball (wildly).

In the production of a sentence in which Loc, Tm, Man, or Mot is selected, it is often possible to replace one of these ADV's by a sentence to which the proper WH-transformation has been applied, provided the matrix contains an undeveloped Loc, Tm, Mot, or Man,
and provided that the constituent contains the same ADV element as the matrix. For example,

M: We play ball + Loc.
C: John plays ball in the park. \[\rightarrow\] We play ball where John plays ball.

You will notice that the matrix contained an undeveloped _Loc_ and that the constituent contained a _Loc_ phrase _IN THE PARK_, which was subsequently WH'd to produce the Wh-word _where_. The entire constituent sentence (after _IN THE PARK_ was WH'd) replaces the undeveloped _Loc_ in the matrix to produce the complex sentence _WE PLAY BALL WHERE JOHN PLAYS BALL_. It is possible then to have embedded sentences beginning with _where (ever)_ , replacing _Loc_ or _Mot_; _when (ever)_ , replacing _Tm_; and _how (ever)_ , replacing _Man_.

For example,

(92) M: You may go + Loc.
   C: You want to go to the show. \[\rightarrow\] You may go where (ever) you want to (go).

(93) M: You may go + Tm.
   C: You want to go tomorrow. \[\rightarrow\] You may go when (ever) you want to (go).

(94) M: We play ball + Tm.
   C: Summer comes this year. \[\rightarrow\] We play ball when (ever) summer comes.

(95) M: He plays the game + Man.
   C: He wants to play the game unfairly. \[\rightarrow\] He plays the game how (ever) he wants to (play the game).

Sentences which are embedded in a matrix containing a _Tm_ undeveloped may begin with such _Tm_-words as _after, before, while_ and _as_. For example,

(96) M: I am going home + Tm.
   C: The game has been completed this afternoon. \[\rightarrow\] I am going home after the game has been completed.
I went home before the game began.

I saw your friend while I was walking down the street.

We have, then, a transformational rule for replacing the ADV, whether it be Loc, Mot, Tm, or Man:

ET-34: Adverbial Replacement (LOC, TM, MOT, MAN).

In the expansion of ADV in the phrase structure grammar the undeveloped symbol ₯ provides for a second type of adverbial embedment. In the production of a sentence, the native speaker of English may wish to use a second sentence that is closely related to the first sentence. He might do this in the following way:

(100) M: The boy is happy + ₯. The boy is happy because the girl smiled at him.

In this example, the undeveloped ₯ was replaced by because + S; it may be replaced in other examples with although + S, though + S, even though + S, if + S, as if + S, as though + S, for + S. For example,

(101) M: I admired her + ₯. I admired her because she was honest.

(102) M: I got credit for English + ₯. I got credit for English although I wrote no better this year.

(103) M: She read her speech + ₯. She read her speech as if she were really interested in her topic.
Thus, we have a second transformational rule for replacing the ADV:

ET-35: Adverbial Replacement ($\phi$).

Expanding the Adverb

The phrase structure rules already provide for the expansion of ADV into \textit{Man + C}, where \textit{Man} is \textit{so + Adj + ly} and where \textit{C} is replaced with \textit{that + S}. For example,

(106) M: The team fought so tenaciously + C. \quad \longrightarrow \quad \text{The team fought so tenaciously that it won the game.}

(107) M: She stroked the ball so fiercely + C. \quad \longrightarrow \quad \text{She stroked the ball so fiercely that it broke the net.}

(108) M: The lawyer spoke so rapidly + C. \quad \longrightarrow \quad \text{The lawyer spoke so rapidly that he confused the jury.}

You will notice in each example that the \textit{Man}-word (usually \textit{Adj + ly}) is preceded by \textit{so} and that the constituent sentence is attached to the matrix at the \textit{C} slot by prefixing it with \textit{that}. We now add the last embedding transformational rule to the list:

ET-36: Adverbial Expansion of \textit{Man + C}.
**LIST OF EMBEDDING TRANSFORMATIONS**

1. Relative Clause (be)
2. Adjective (by deletion and obligatory placement)
3. Relative Clause (Have)
4. With-phrase (by simple transformation of ET-3)
5. Relative Clause ($V_b$)
6. Gerundive Adjective (by deletion and optional placement)
7. Compounds
8. Genitives
9. That + S (Subject)
10a. (That) S (Object)
10b. That + S (Object)
11. WH + S (Subject)
12. WH + S (Object)
13. WH + Inf (Subject)
14. WH + Inf (Object)
15. Nominal Inf of Obligation
16. Inf (Subject)
17. Inf (Object)
18. Inf (Purpose)
19. Gerundive Nominal
20. Gerundive Nominal of Purpose
21. Abstractive Nominal
22. Adjective + Inf
23. Adjective + That-clause
24. Adjective + Gerundive
25. $V_{Ta}$ (I caught him stealing the money.)
26. $V_{Tb}$ (I prevented him from stealing the money.)
27. $V_{Tc}$ (I advised him to return the money.)
28. $V_{Td}$ (I considered him to be the thief.)
29. $V_{Te}$ (I let him return the money.)
30. $V_{Tf}$ (I called him a fool.)
31. $V_{Tg}$ (I made him angry.)
32. $V_{Th}$ (I put the ear in the garage.)
33. $V_{Tn} + C$ (I kept on talking.)
34. Adverbial Replacement (Loc, Tm, Mot, Man)
35. Adverbial Replacement ($g$)
36. Adverbial Expansion of Man + C.
CONJOINING TRANSFORMATIONS

Any two sentences can be conjoined by such words as AND, BUT, OR, NOR, EITHER . . . OR, NEITHER . . . NOR, BOTH . . . AND, and NOT ONLY . . . BUT ALSO. For example,

(109) M*: The boat sank.
M*: We all swam ashore. ----> The boat sank and we all swam ashore.

(110) M*: The boat sank.
M*: Nobody drowned. ----> The boat sank but nobody drowned.

(111) M*: The boys swam.
M*: The girls swam. ----> Neither the boys swam nor the girls swam.

In general, conjoining seems to be a very simple procedure in English; any two or more sentences can be joined together by the simple addition of one of the above conjoining words, sometimes called conjunctions. We will consider all conjoining to be accomplished by a single transformation, no matter which conjunction is used; we now add this conjoining transformational rule to the list:

CT-37: Conjoining, by means of AND, BUT, OR, NOR, EITHER . . . OR, NEITHER . . . NOR, BOTH . . . AND, and NOT ONLY . . . BUT ALSO.

DELETING TRANSFORMATIONS

Several of the embedding transformations and the conjoining transformation produce complex sentences from which certain elements are optionally deletable. We will examine these deleting transformations in order.

Common Elements:

You have been deleting common elements from your sentence automatically for many years already. In the sentence I LEFT THE BREAD
AND (I LEFT) THE POTATOES., the second I LEFT is deletable. In many cases like this one, when two sentences are conjoined, elements in the second matrix sentence which are common or identical to elements in the first are omitted or deleted.

For example,

(112) Neither the boys swam nor the girls swam.  
      Neither the boys nor the girls swam.

(113) The boys went to the show and the girls went home. 
      The boys went to the show and the girls home.

(114) What he did can be told now and where he went can be told now. 
      What he did and where he went can be told now.

(115) His lonely hotel room seemed cold and his lonely hotel room seemed damp. 
      His lonely hotel room seemed cold and damp.

(116) The girls were purple but the boys were red. 
      The girls were purple but the boys red.

(117) George shoots lions and George shoots tigers. 
      George shoots lions and tigers.

(118) I saw Jim at the show but I saw John at the game. 
      I saw Jim at the show but John at the game.

(119) She bought shoes downtown and she bought dresses downtown but she bought gloves at the shopping center. 
      She bought shoes and dresses downtown but gloves at the shopping center.

(120) I bought milk at the store and I bought bread at the store and I bought eggs at the store. 
      I bought milk, bread and eggs at the store.

In example (120), you will notice that if you conjoin three sentences (or more) and then delete the common elements from the second and third matrix leaving only one word from each of these matrixes, you must put a comma between the first and second elements (milk, bread) but not before the and joining the second to the third element (bread
and eggs). It should be noted, however, that a comma before the and is optional, although the current trend is towards putting no comma there. For example:

(121) We saw lions, tigers, elephants and giraffes at the zoo.
and (122) We saw lions, tigers, elephants, and giraffes at the zoo.
Either example is correctly punctuated according to modern practice, but (121) is rapidly becoming the preferred procedure. We now add the first deleting transformational rule to the list:

DT-38: Deletion of common elements in conjoined sentences.

Relative Clause Deletions:

WH + Aux + Be is deletable in almost all relative clauses in which the constituent sentence MV is BE. When the constituent sentence contains only Adj following the BE-word verb, the Adj must be moved and placed before nominal in the complex sentence. When the constituent sentence contains a nominal, a Loc word or phrase, or an Adj + C construction following the verb BE, that element may not be moved. For example,

(123) The boy who is on the corner is my friend. \[\text{The boy on the corner is my friend.}\]
(124) The job which is presently available pays well. \[\text{The job presently available pays well.}\]
(125) The boy who is eager to study is needed in college. \[\text{The boy eager to study is needed in college.}\]
(126) The boy who is happy is healthy. \[\text{The happy boy is healthy.}\]
(127) The boy who is a Boy Scout is my friend. \[\text{The boy, a Boy Scout, is my friend.}\]
You will notice in example (127) that when the constituent verb Be is followed by a nominal and when the WH-word + Aux + BE is deleted, the nominal must be surrounded by commas in the complex sentence.

In complex sentences in which the main verb of the relative clause is not BE, no deletion may occur unless the Aux is progressive, i.e., tns + be + ing; when the Aux is progressive, then the WH-word + tns + be may be deleted in the relative clause. When the MV of the relative clause in the progressive form is Vb only, the Vb + ing (the gerundive adjective, ET-6) may be placed before the nominal in the complex sentence. For example,

(128) The boy who is singing on the corner is my friend. ----> The boy singing on the corner is my friend.

(129) The boy who has been singing at the club was very good. ----> The boy singing at the club was very good.

(130) The boy who is running is my friend. ----> The boy running is my friend. OR The running boy is my friend.

We now add a second deletion transformational rule to the list:


Adverbial Replacement Deletions:

There are a number of circumstances in which elements of adverbial replacements, either of the ET-34 or ET-35 variety, may be deleted. For example,

(131) We got a good tan while we were swimming. ----> We got a good tan while swimming.

(132) We discussed politics while we were playing golf. ----> We discussed politics while playing golf.

(133) When he was asked about it, he denied it completely. ----> When asked about it, he denied it completely.
In the case of constituent sentences that have been embedded in an undeveloped TM symbol in the matrix sentence (see examples (131) - (133)), it seems possible to delete Nom + tns + Be, but only when the NOM's of the matrix and constituent sentences are identical. For example, from a sentence such as:

(134) While we were swimming, a shark swam by.

there is no such sentence as:

(135) *While swimming, a shark swam by.

In general, it seems that the "dangling modifier" (as in example (135)) is a product of an adverbial embedment deletion in which the constituent and the matrix sentences have different NOM's: there is no such sentence in English as (136) *While running down the street, the sun felt hot. However, there is such a sentence as (137) While we were running down the street, the sun felt hot. In summary, then, we will say that in complex sentences containing an adverbial embedment in TM, it is possible to delete Nom + Aux + BE if, and only if, the matrix and constituent NOM's are identical.

The conditions under which complex sentences containing adverbial embedments in g may undergo deletions are quite similar to those applying to the adverbial replacement in TM. In the case of adverbial embedments in g in which the constituent sentence begins with a TM-word that serves as a clause-marker, it is possible to delete the Nom + Aux + Be. For example,

(138) As if he had been asked, he sat down to dinner with us.  ———— As if asked, he sat down to dinner with us.

(139) Although I was tired, I agreed to listen to him.  ———— Although tired, I agreed to listen to him.
(140) Even though he was running away, he stopped to eat lunch. \[\rightarrow\] Even though running away, he stopped to eat lunch.

You will notice that, before the deletion of Nom + Aux + Be can take place in adverbial embeddings in \(\&\), the NOM's of the matrix and constituent sentences must be identical. Incidentally, you will notice in examples (133), (134), (137), (138), (139), and (140) that when a clause takes the place of an undeveloped ADV (Loc, Tm, Mot, Man) or \(\&\) and this clause is subsequently moved to the beginning of the complex sentence, a comma (,) separates the displaced clause from the rest of the complex sentence. We are now ready to add the last deletion transformational rule to the list:

\textbf{DT-40: Adverbial Embedment Deletion, whether ADV (Loc, Tm, Mot, Man) or \&}.

\textbf{SIMPLE TRANSFORMATIONS}

Simple transformations are applied only to single sentences. If the sentence is a kernel sentence, the simple transformation will make it a complex sentence. If the sentence is already complex, it of course remains complex after the application of the simple transformation. We shall examine several types of simple transformations.

\textbf{Passive Transformation:}

The passive transformation rule applied to a kernel sentence with a transitive verb or to an intransitive verb followed by a Prep + Nom construction would give a complex sentence like:

(141) The boy hit the ball. \[\rightarrow\] The ball was hit (by the boy).

or (142) The boy sat in the chair. \[\rightarrow\] The chair was sat in (by the boy). In example (141), the verb HIT is a \textit{V}_{tr}, while in example
(142), the verb SIT is a \text{V}_{\text{in}} followed by a \text{Prep + Nom IN THE CHAIR.} You will notice in each example that the final \text{BY + Nom phrase is optionally deletable; this seems to be characteristic of all passive transforms.}

There is a particular \text{V}_{\text{tr}}, however, which produces two passives instead of the usual one. The \text{V}_{\text{tiot}} verb has as one of its alternate forms a sentence in which the \text{to} has been dropped; for example, GIVE is a \text{V}_{\text{tiot}} verb and this sentence: (143) \text{HE GAVE THE BOOK TO ME} has an alternate form: (144) \text{HE GAVE ME THE BOOK.} This second form, example (144), has two passives:

(145) \text{I was given the book by him.}

and (146) \text{The book was given me by him.}

To allow for both of these passives, the general rule will be written in this way:

\[
\begin{align*}
\text{V}_{\text{in}}^+\text{Prep} & \quad \text{V}_{\text{in}}^+\text{Prep} \\
\text{Nom}^+\text{tns} & \quad \text{Nom}^+\text{tns} + \text{BE}+\text{EN} \\
\text{V}_{\text{tr}} & \quad \text{V}_{\text{tr}} + \text{(by + Nom)}
\end{align*}
\]

Thus, in the sentence \text{HE GAVE ME THE BOOK}, either \text{GAVE} (the \text{V}_{\text{tiot}}) or \text{GAVE ME} (the \text{V}_{\text{tr}}) can be selected as element 3. If the \text{V}_{\text{tiot}} \text{GAVE} is chosen, the analysis of the sentence will be:

\[
\begin{align*}
\text{He+past+GIVE+me+the book} & \quad \text{I+past+BE+EN+GIVE+the book+by Him} \\
1 \quad 2 \quad 3 \quad 4 \quad 5 & \quad 4 \quad 2 \quad 3 \quad 5 \quad 1
\end{align*}
\]

\text{He gave me the book} \quad \text{I was given the book by him.}
If the \( V_{\text{tr}} \) had been chosen, the analysis of the sentence would be:

\[
\text{He + past + GAVE ME the book + \( \_ \_ \_ \_ \_ \_ \_ \) \rightarrow \text{The book + past + BE + EN + GIVE ME + \( \_ \_ \_ \_ \_ \_ \_ \) by him}
\]

He gave me the book \( \rightarrow \) The book was given me by him.

This rule may now be listed as the first simple transformational rule:

\[\text{ST-41: Passive Transformation of sentences in } V_{\text{in + Prep}}, V_{\text{tr}}, \text{ or } V_{\text{tiot}}.\]

**It-Inversion Transformation:**

The It-Inversion is applied only to complex sentences in which a constituent sentence was embedded in the subject position of a matrix sentence as a That + S, WH + S, or an Inf as Subject. For example:

(a) IT is surprising.
(b) We won the game.
(c) That we won the game is surprising.
(147) It is surprising that we won the game.

(a) It seems unnecessary these days.
(b) They play football with vigor.
(c) To play football with vigor seems unnecessary these days.
(148) It seems unnecessary to play football with vigor these days.

(a) IT bothered him.
(b) He had done something to the team's morale.
(c) What he had done to the team's morale bothered him.
(149) It bothered him what he had done to the team's morale.

In each set, the kernel sentences (a) and (b) produce a complex sentence (c). The complex sentence (c) is then inverted, i.e., its elements are re-ordered: Nom + VP \( \rightarrow \) It + VP + Nom through IT inversion. We now add this simple transformational rule to the list:

\[\text{ST-42: It-Inversion of complex sentences in That + S, WH + S, and Inf as Subject.}\]
There-Inversion Transformation:

The There-Inversion transformation is similar to the It-Inversion transformation above, except that the There-Inversion can be applied to both kernel and complex sentences. For example:

(150) A man is there. ------→ There is a man there.

and (151) To ban the bomb is a movement among liberals. ------→ There is a movement among liberals to ban the bomb.

In the complex sentence (151), the There-Inversion re-orders the elements much as the It-Inversion does:

Nom + VP ----→ There + VP + Nom.

In the kernel sentence (150), the re-ordering of the elements is somewhat different: Nom + MV + Comp ----→ There + MV + Nom + Comp.

We now list this second inversion transformation rule:

ST-43: There-Inversion of kernel or complex sentences.

Question-Transformation:

This transformation appears in two major forms: the yes-no question (i.e., the question that is produced may be answered by "yes" or "no") and the WH-question. From this kernel sentence

(152) The cowboy saw a mirage suddenly in the desert yesterday.

the following six questions can be derived:

(153) (yes-no) Did the cowboy see a mirage suddenly in the desert yesterday?

(154) (WH + Nom*) Who saw a mirage suddenly in the desert yesterday?

(155) (WH + Nom*) What did the cowboy see suddenly in the desert yesterday?
(156) (WH + Man) How did the cowboy see the mirage in the desert yesterday?

(157) (WH + Loc) Where did the cowboy see the mirage suddenly yesterday?

(158) (WH + Tm) When did the cowboy see the mirage suddenly in the desert?

If Nom\(^1\) + past + V\(_{tr}\) + Nom\(^n\) + Man + Loc + Tm represents sentence (152), then the yes-no question is produced by the transform past + Nom\(^1\) + V\(_{tr}\) + Nom\(^n\) + ...?, where the pro-verb did replaces the past-morpheme when it has been shifted to the initial position in the question transform. All the WH-questions, except (153), are produced by the transform Wh Man + past + Nom\(^1\) + V\(_{tr}\) + Nom\(^n\) + ...?, where once again the pro-verb did replaces the past-morpheme when it has been shifted away from the main verb. Sentence (154) is produced by the question-transform WH + Nom\(^1\) + past + V\(_{tr}\) + Nom\(^n\) + ...?, where there is no need to shift the past-morpheme away from the main verb when the first Nom is WH'd. When Nom\(^n\) is WH'd and shifted to the initial position in the question-transform, it becomes WHAT if Nom\(^n\) is inanimate, but WHOM if Nom\(^n\) is animate. We are now ready to add the question-transform rule to the list:

ST-44: Question transformation, either yes-no or WH-question.

Negation-shift transformation:

There are a number of V\(_T\) + C verbs which permit the negation word NOT or N'T in the complement derived from the constituent sentence to shift its position from the complement and become attached
to the main verb in the matrix sentence. For example:

C: He was not to leave the room. ——>

(a) I advised him not to leave the room. ——>
(b) I didn't (did not) advise him to leave the room.

C: He is not my friend. ——>

(a) I supposed him not to be my friend. ——>
(b) I didn't (did not) suppose him to be my friend.

(164) M: I expect + C him.
C: He will not lose the game. ——>

(a) I expect him not to lose the game. ——>
(b) I don't (do not) expect him to lose the game.

The shift of the NOT or N'T to the matrix verb is optional with these verbs, so either (a) or (b) complex sentence in the examples (162) - (164) are correct. The V\(_T\) + C verbs which permit this optional negation-shift include the following: ADVISE, APPEAR, BELIEVE, CHOOSE, CONSIDER, DESIRE, EXPECT, IMAGINE, INTEND, LIKE, SEEM SUPPOSE, THINK, WANT, WISH. We now add this second negation-transformational rule to the list:

ST-45: Negation-shift from complement to matrix verb in some V\(_T\) + C verbs.
CHAPTER IV

PROCEDURES

Louis Hjelmslev has said that "A priori it would seem to be a generally valid thesis that for every process there is a corresponding system by which the process can be analyzed and described by means of a limited number of premises."\(^1\) In other words, for every psychological operation there is a logical theory which symbolically characterizes the process. If the theory is an adequate one, that is, if the logical relationships of the theory correspond in some way with the psychological structure of the process, it will enable us to gain new insights into the process.

When Robert Lees concludes that the theoretical character of generative grammar and its consequent explanatory and predictive power promise to lead to new psychological insights into the nature of learning as well as more extensive understanding of the native speaker's capacity to produce novel sentences of his language, he is expressing an understandable confidence in the explanatory power of theory.\(^2\) These hopeful speculations are receiving empirical

\(^1\)Prolegomena to a Theory of Language, p. 9.

\(^2\)Review of Chomsky's Syntactic Structures in Language, Vol. 33, No. 3 (July-Sept. 1957), pp. 405-408.
verification in the psycholinguistic research of Johnson and Jenkins, who are providing increasing evidence of the psychological reality of generative grammar theory. It is in fact becoming speculatively and empirically compelling to hypothesize that the logical structure of a generative grammar is analogous to the psychological structure of the process of sentence production. It is as a model of the process of sentence formation that generative grammar should provide the most fruitful framework with which to investigate and modify the composing process.

It may be premature to expect a young theory to provide the basis for revolutionizing an obsolete English curriculum, but the apparent paucity of any convincing research in the area of language learning based on present practices compels one to turn to generative grammar for new insights. It is clear that structural grammar, even though it has achieved some popularity through numerous articles in the educational journals, has neither theoretical aspirations nor explanatory power and has consequently done more to obfuscate our specification of meaningful linguistic classroom tasks than to provide

3 See items listed in the bibliography under Neal Johnson and J. J. Jenkins. There is a great deal of current research in psycholinguistics that is presently available only in mimeographed form. The studies listed in the bibliography are representative of studies in which generative grammar theory provides the framework for the formulation of testable hypotheses. When a theory suggests a testable hypothesis, then any verification of the hypothesis lends empirical support to the status of the theory.

a procedure for re-organization. For example, the tendency of the structural grammarian to regard "correctness" as a statistical matter has been coolly received by those who recognize such a thing as stylistic perfection. There are levels of grammaticality, and teachers of English have always intended to lead their students into higher levels of linguistic competence. A pedagogically acceptable grammatical system should provide a description of what the competent speaker of English knows to be well-formed sentences of the language.

Such observations as these provided the initial motivation for the investigation to be described in the following chapters. The results seem sufficiently significant to justify further experimentation and to provide a basis for the development of effective materials for the teaching of composition.

Procedures

A. Subjects

Fifty ninth grade pupils of The University School of The Ohio State University were randomly assigned to an experimental and a control section. During the two-year period of the investigation each class studied what would be considered the regular curriculum at the school with the exception that the experimental class studied the version of generative grammar described in the preceding two chapters. Of the original fifty pupils, the experimental class lost five and the control class four.
B. Design

Written compositions were collected from both sections during the first three months of the first year and the last three months of the second year of the investigation. Altogether 3,636 sentences were collected and analyzed. The forty-five transformational rules described in Chapter III served to identify the grammatical operations underlying each sentence in the sample. A complete list of these transformations with examples will illustrate the nature of this analytical instrument.

Embedding Transformations

Noun Expansion

1 - Relative Clause (Be):

I admire my English teacher, who is a scholar.

2 - Adjective (by deletion and obligatory placement):

A handsome lad.

3 - Relative Clause (Have):

The book which has no index is useless.

4 - With-phrase (by simple transformation of ET-3):

A book with no index is useless.

5 - Relative Clause \((V_b)\):

The boy who scored the touchdown was cheered.

6 - Gerundive Adjective (by deletion and optional placement):

A smiling girl.

7 - Compounds: He stepped into the bull ring.

8 - Genitives: The horse's mouth/ The mouth of the horse.
Noun Replacement

9 - That + S as subject:

That I am failing the course disturbs me.

10a- (That) S as object:

I know he is a diligent student.

10b- That + S as object:

I rejoice that he has made the team.

11 - WH + S as subject:

What he has already learned astonishes me.

12 - WH + S as object:

I know what annoys him.

13 - WH + Inf as subject:

What to visit at the Fair is a problem.

14 - WH + Inf as object:

My cousin knows what to visit.

15 - Nominal Inf of Obligation:

Here is a book for you to know.

16 - Inf as subject:

To appear on television is an exciting experience.

17 - Inf as object:

I tried to answer the question correctly.

18 - Inf of purpose:

The exercises are designed to help you.

19 - Gerundive Nominal:

Tom's hot-rod ding disturbed his mother./ She objected to his continuous complaining.
20 - Gerundive Nominal of Purpose:

I have a knack for getting into trouble.

21 - Abstrative Nominal:

His eagerness to depart surprised me. I admired the girl's reluctance to go.

Adjective Expansion

22 - Adjective + Inf: You are free to get an education.

23 - Adjective + That-clause: I am happy that you have enrolled.

24 - Adjective + Gerundive: Lures are excellent for catching fish.

Verb Expansion

25 - \( V_{Ta} \): I caught him stealing the money.

25 - \( V_{Tb} \): I prevented him from stealing the money.

27 - \( V_{Tc} \): I advised him to return the money.

28 - \( V_{Td} \): I considered him to be the thief.

29 - \( V_{Te} \): I let him return the money.

30 - \( V_{Tf} \): I called him a fool.

31 - \( V_{Tg} \): I made him angry.

32 - \( V_{Th} \): I put the car in the garage.

33 - \( V_{In} + C \): I kept on talking.

Adverbial Replacement

34 - Adverbial Replacement in Loc, Tm, Mot, or Man:

You may go wherever you wish.

35 - Adverbial Replacement (\( g \)):

He is happy because she smiled at him.
Adverbial Expansion

36 - Adverbial Expansion of \textit{Man + C}:

The lawyer spoke so rapidly that he confused the jury.

Conjoining Transformations

37 - Conjoining: The boat sank but nobody drowned.

Deleting Transformations

38 - Common elements deletion:

His lonely hotel room seemed cold and his lonely hotel room seemed damp.

39 - WH + BE deletion: The boy who is starting at quarterback is in my class.

40 - Adverbial embedment deletion:

As if he had been asked, he sat down to dinner with us.

Simple Transformations

41 - Passive:

The boy hit the ball--The ball was hit (by the boy).

42 - It-Inversion: It is surprising that we won the game.

43 - There-Inversion: There is a thief among us.

44 - Question: Are you going to the game tomorrow?

45 - Negation-shift:

I advised him not to enroll--I didn't (did not) advise him to enroll.

These forty-five grammatical structures are instrumental in the sentence evaluation techniques developed in the project, for they provide various scores for measuring the grammatical changes occurring over the two-year period in the pupils' writing. These structures,
moreover, can be identified quite objectively in a sample of prose by analysts; and of course it is the use of these structures in writing that is measured—not the pupil's awareness of or ability to recall their labels. This particular means of sentence evaluation, therefore, is applicable to the writing produced in both the control and the experimental classes. It measures the quality of writing independent of the instruction accorded each class.

**Sentence Evaluation Techniques**

The Sentence Evaluation Techniques (SET) consist of three component scores:

1 - Structural Complexity Score (SCS)
2 - Proportion of Well-Formed Sentences (PWF)
3 - Error Change Score (ECS)

The SCS indicates the grammatical or structural richness of the sentences produced in the experiment; the PWF reveals the ratio of acceptable to unacceptable sentences; and the ECS shows the trend in the frequency and kinds of grammatical mis-operations that occurred in pupil writing.

**Structural Complexity Score**

The forty-five transformations identified in the generative grammar adapted for this study were used to reconstruct the transformational history of every sentence in the prose sample. This process of reconstruction reverses the proper grammatical function of the transformations, whose effect is regularly to create new sentences rather than to analyze ones already produced. When sentences have
been properly—that is, grammatically-formed, however, they can
routinely be reduced to the kernel sentences from which they have been
produced; and the transformations that have been applied can likewise
be identified. The number of grammatical operations that have taken
place in a particular sentence, then, becomes a score that character-
izes the structural complexity of that sentence. The lowest possible
score is 1, which has been assigned to a kernel sentence; the score
for a complex sentence becomes \( 1 + \text{the number of transformations it}
contains}. Thus a sentence using two embedding transformations, one
conjoining transformation, and one simple transformation receives an
SCS of 5. The following sentences, excerpted from the sample, illus-
trate further the computing of the SCS; the number in parentheses
indicates the SCS, and the number above a particular word identifies
one of the transformations as listed on pages 122-125.

(1) The rain splattered at the window.

29

(3) Then at long last I could see the smoke rise from the

8

chimney of my house.

34 7

(4) As these thoughts passed through my now-numbed brain, I

2

noticed the dull rumbling in the distance.

1,39 37,38 7

(7) Her hands, long and delicate-looking, have almond-

shaped fingernails.
Finally the pawns, whose initiative and number provide a pattern of battle, are the brave protecting agents of the more powerful forces of the army, despite their lack of strength.

After every sentence was analyzed in this manner, the mean structural complexity score was computed for Initial and Final well-formed and Mal-formed sentences for each pupil. The principal comparison was then made by analysis of variance applied to the gains scores.

Tabulating the specific transformations that occurred in every sentence of the sample made additional comparisons possible. What class of transformations—among the eight identified in the analytical instrument—was relied upon most heavily, for example? Which showed the greatest change between the Initial-writing and the Final-writing?

**Proportion of Well-Formed Sentences**

The proportion of well-formed sentences was obtained by dividing the total number of sentences into the number of well-formed sentences for each subject in the study. To be considered well-formed, a sentence had to be both intuitively acceptable to the analysts and derivable from the rules of the grammar. Before a sentence was considered not well-formed, the analysts had to demonstrate that it could not be derived from the rules. Whether a sentence was well-formed or mal-formed, however, it was analyzed and assigned a structural complexity score.
score. The following excerpt from one subject’s prose illustrates how this part of the analysis was carried out:

8  10a 43  2
(7) Later that day Irea’s Mother said, “There’s a little
girl outside waiting for you.”

5, 39
(1) Irea looked outside. (3) Yes, there was a little girl.

34  27  2
(5) When Irea stepped outside, she expected the little girl to go
home, but she didn’t. (10*) They played all afternoon, when the
little girl’s mother came, Susie (the little girl) asked if Irea
could spend the night and that was fine. (4) As Irea got into the
car, she couldn’t believe her eyes; Susie’s father was Negro also.

37  8
(3*) Now Irea belonged somewhere, she had a real friend.

The number in parentheses preceding each sentence indicates the SCS for that sentence; the number above a particular word identifies the transformation being used. An asterisk following an SCS indicates a mal-formed sentence; an asterisk following a transformation number indicates that the transformation was mis-applied. Of the seven sentences presented above, the five well-formed sentences have SCS’s of (7), (1), (3), (5), and (4); and the two mal-formed sentences have SCS’s of (10*) and (3*). In the first mal-formed sentence, the 37* indicates that the conjoining transformation was not properly applied though one was needed; in the second mal-formed sentence, the 37*-35
indicates that a conjoining transformation was improperly used for an adverbial replacement. Dividing the total number of sentences into the number of well-formed sentences in this severely limited example produces a PWF (Proportion of Well-Formed Sentences) of .714.

Error Change Score

These five classes of errors--or grammatical mis-operations--were identified and tabulated:

1. Mis-application of a transformational operation.
2. Use of one transformation when another is required.
3. Use of a transformation when none should have been used.
4. Omission of a required transformation.
5. Co-occurrence error: the use of mutually exclusive grammatical elements in kernel sentences or in kernel sentences underlying complex sentences.

Chapter 3 sets forth the proper ways in which transformations are applied, but brief examples of the various classes of errors should be useful.

Class 1 Error: In the sentence, "While Carson Drew was working on a case, he sometimes let his daughter help him, who does a very good job," Transformation 5 has been misapplied. The placement of the relative clause must come directly after daughter.

Class 2 Error: Sentence (3*) above contains a Class 2 Error. The conjoining transformation was used instead of an adverbial replacement; one way of handling the sentence grammatically would have been to replace the comma with because.
Class 3 Error: In the sentence, "Such ideas have and can be found in many books," a common element deletion --Transformation 38--has been applied to remove been after have. This transformation should not have been used.

Class 4 Error: In the sentence, "He always looks clean though that's one thing in his favor," a conjoining transformation is omitted. A semicolon after though would have made the sentence grammatically acceptable.

Class 5 Error: In the sentence, "As a youth, he was averse from reading his school assignments," averse from should have been averse to. A fragment like "The leaves falling from the trees," which does not have the complete verb phrase required by the phrase structure rules (see Chapter 2), also exemplifies this class of errors.

After all the occurrences of errors were identified for each subject in the study, the Initial-scores were compared with the Final-scores to determine what changes in error reduction had taken place.
CHAPTER V

ANALYSIS OF DATA

The Writing Sample

Samples of writing were collected throughout the two-year period of the experiment. Approximately 70,000 words were analyzed. Initial samples were collected during the first three months of the experiment and final samples were collected during the last three months. All writing was produced by the pupils as part of class assignments. In each class improvement in pupil writing was one of the major objectives. The classes differed only in content: no formal grammar was studied in the control class; the grammatical content described in Chapters 2 and 3 was studied by the pupils in the experimental class.
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| Totals | 556 | 2530 | 839 | 5024 | 1395 | 7554 | 411 | 2680 | 99  | 965 | 510 | 3645 |

#### Well-formed Structural Complexity Scores

Each sentence in the sample was assigned a structural complexity score which represents the total number of grammatical operations it has taken to produce the sentence. Average structural complexity scores for well-formed sentences are presented in Table 3.

The increase in average structural complexity scores for well-formed sentences was 3.793 for the control class and 9.315 for the experimental class. A difference of over 5 grammatical operations per sentence seems to indicate that the experimental class had
significantly extended its capacity for producing complex well-formed sentences. However, a closer examination reveals that the greatest changes were made by only four students, one of whom shows a structural complexity increase of 64.741.

Table 3

Average Structural Complexity Scores for Well-formed Sentences

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Average 7.009 10.802 + 3.793 7.310 16.625 +9.315

Statistical evaluation of change in average structural complexity scores for well-formed sentences by analysis of variance provides only minimal support for any contention that the increased average complexity scores in the experimental class can be attributed to the study of generative grammar.
Even though the statistical analysis fails to indicate a significant difference between the two classes, an examination of the prose written by the experimental class is suggestive. For example, student #8 produced the following sentence, which has a complexity rating of 83:

The argument had gone on for almost three weeks, and it was obvious that neither side was going to give in, nor let the other side's argument seem reasonable, and the neutral faction probably had his own views which were probably more sensible than either of the other two or any other for that matter, but the other two with their overwhelming force which they seemed to exert on the neutral faction made that faction feel completely useless as he sat there wondering why they were arguing while he had the answer, and was willing to share it with them who argued and threatened the very success of the project which they had masterminded to the last detail and had worked so hard to get started and which was nearing completion as they argued about the simple matter of how many areas to deliver questionnaires to with the limited amount of time which they had left to complete the project, and there was no way in which he could halt the argument as it raged on and on while the precious time which they had begged for was slipping away into the past where they could never gain it back again or use it for a better purpose than arguing about a simple, insignificant problem which compared to the problems of the world seems like two children arguing over a toy which gets broken during the fight in the same way the project is being torn into little pieces which will be no good to anyone but a fool who will accept anything as being the truth.

The most complex well-formed sentence in the initial writing of the same student had a complexity score of 15:

The word "benediction" means blessing, so I think that the whole argument means that he is returning to his Indian family or at least this is what we are supposed to think for a while.

---

5Relevant statistical figures are tabulated in Donald R. Bateman and Frank J. Zidonis, The Effect of the Knowledge of Generative Grammar on the Growth of Language Complexity.
It seems likely that given sufficient motivation this writer has the capacity for voluntarily producing well-formed sentences of high complexity. The relative infrequency of high complexity sentences among the students in the control group suggests the possibility that they did not have this capacity. Because of the role motivation plays in the production of unusually complex sentences, it is clear that this study was not organized to measure the capacity for producing complex sentences. Consequently, any conclusion concerning the relative capacities of the two classes for producing sentences of increased complexity can be only speculative.

**Mal-formed Structural Complexity Scores**

The increase in average structural complexity scores for mal-formed sentences was 7.511 for the control class and 3.585 for the experimental class. Table 4 indicates that as both classes learned to write well-formed sentences of increased complexity they also increased the average structural complexity of mal-formed sentences, though the experimental class was better able to hold this tendency in check.

Statistical analysis fails to indicate a significant difference between control and experimental classes. Consequently, any change in average structural complexity scores of mal-formed sentences cannot be attributed to the teaching of the grammar. Significant positive changes would, of course, have indicated that the teaching of the grammar had had a negative influence on the students' ability to control the transformational operations of English. Though it does
not fall within the range of significant statistical measurement, the smaller increase of average structural complexity scores for malformed sentences of the experimental class provides some extra-statistical corroboration for the effectiveness of the grammar.

**Proportion of Well-formed Sentences**

Table 5 shows the change in proportion of well-formed sentences. For the control class there is an increase of 3.5%; for the experimental class, 31.8%. It might seem unusual for the percentages of well-formed sentences in the initial writing to be as low as they were (59.5% for the control class and 55.9% for the experimental class). These relatively low percentages reflect the rigor of the criteria for well-formedness. Customary compositional admonishments include such inexact judgments as "awkward," "vague," and utilize other undefined terms that identify the grader's intuitive recognition of mal-formedness. In the analysis of the prose samples in this study, explicit grammatical demonstrations of intuitions of mal-formedness were required. It was not enough to recognize that a sentence was not well-formed; the exact character of the mal-formedness had to be explicitly attributed to mal-functions of phrase structure or transformational operations. A careful and detailed classification and sub-classification of errors led to an explicit definition of mal-formedness that could be applied in a quite mechanical way.

Analysis of variance applied to the gains scores for proportion of well-formed sentences provides the clearest conclusions of the
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Table 5

Change in Proportion of Well-formed Sentences

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Average .595 .630 +.035 .559 .877 +.318
study. The difference in the gains scores for proportion of well-formed sentences is significant at the .01 level for all comparisons and this significant difference can unambiguously be attributed to the study of the grammar by the experimental class.\(^2\)

**Error Change Scores**

Tables 6 - 9 present changes in the frequency of the five classes of errors and total errors. Errors were classified as follows:

1. Mis-application of a transformational operation.
2. Use of one transformation when another is required.
3. Use of a transformation when none should have been used.
4. Omission of a required transformation.
5. Co-occurrence error: the use of mutually exclusive grammatical elements in kernel sentences or in kernel sentences underlying complex sentences.

**Class 1 Errors**

Table 6 shows initial and final frequencies of Class 1 Errors for control and experimental classes. Both classes were clearly able to reduce frequency of Class 1 Errors substantially. Average reduction for the control class was 8.9 (39.82\%) and for the experimental class 13.67 (79.06\%). Since the number of sentences in the initial sample for both control and experimental classes is unequal to the number of sentences in the final sample, the initial frequencies for both classes have been adjusted so that initial and final tabulations can be meaningfully compared. The greater reduction made by the experimental class would appear to be clearly significant, though the

\(^2\)It is conventional to refer to a level of significance of .05 or .01. When a statistical evaluation indicates that the acceptance of the hypothesis is significant at the .01 level, it means that there is only one chance in a hundred that the hypothesis should have been rejected.
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Average $22.35$ $13.45$ $-8.9$ $17.29$ $3.62$ $-13.67$

Percent of Error Reduction: $39.82\%$ $79.06\%$
statistical analysis is not unambiguous. The comparison of initial and final scores is significant at the .01 level and the comparison of the control and experimental scores is significant at the .01 level, though the failure of the interaction between these two sets of scores to be significant weakens any contention that the experimental class's greater reduction was unambiguously a result of studying the grammar. In other words, both the control and experimental classes reduced Class 1 error production significantly, though the experimental class's greater change was not enough greater for it to be considered statistically significant. However, the clear relationship between increase in proportion of well-formed sentences and decrease in error production substantially supports the contention that the experimental class's greater change is attributable to its study of the grammar.

**Class 2, 3, and 4 Errors**

The relative infrequency of errors in these classes suggested that statistical analysis would be undesirable. Table 7 shows initial (adjusted) and final frequencies of Class 2, 3, and 4 Errors. Class 2 Error reduction is the same for the experimental and control classes; the experimental class made considerably more Class 3 Errors in the initial sample of writing than the control class, though most of these errors were eliminated in the final sample of writing; the control class made considerably more Class 4 Errors than the experimental class, though it substantially reduced them in the final sample of writing. The lack of correspondence between Class 3 and 4 Errors makes any kind of comparison of the two classes impossible.
Table 7

Change in Frequency of Class 2, 3, and 4 Errors

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</table>
Class 5 Errors

Table 8 shows initial (adjusted) and final frequencies of Class 5 Errors for control and experimental classes. Both the experimental and the control classes were able to reduce frequency of Class 5 Errors substantially. Average reduction for the control class was 6.55 (51.7%) and for the experimental class 10.48 (91.29%). The greater reduction of the experimental class would appear to be clearly significant, though statistical analysis is again not unambiguous.

There is a significant difference between the initial and final scores at the .01 level when they are compared independently of experimental and control classes. Both classes, therefore, significantly decreased production of Class 5 Errors. Initial and final scores for control and experimental classes when they are compared independently of initial and final scores are significant at the .05 level. However, the absence of a significant interaction between the two sets of scores weakens any contention that the experimental class's greater reduction of Class 5 Errors is a result of studying the grammar.

The clear relationship between increase in proportion of well-formed sentences and decrease in error production substantially supports the contention that the greater change of the experimental class is attributable to its study of the grammar. The greater significance of difference between the experimental and control classes in respect to Class 1 Errors (.01) as opposed to Class 5 Errors (.05) suggests that the study of the grammar is more directly related to the reduction of Class 1 Errors. This tentative (and extra-statistical)
Table 8

Change in Frequency of Class 5 Errors

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<tr>
<td>17</td>
<td>13</td>
</tr>
<tr>
<td>18</td>
<td>15</td>
</tr>
<tr>
<td>19</td>
<td>5</td>
</tr>
<tr>
<td>20</td>
<td>39</td>
</tr>
</tbody>
</table>

Total 253 122 -131 241 21 -220

Average 12.65 6.1 -6.55 11.48 1 -10.48

Percent of Error Reduction: 51.78% 91.29%
conclusion would receive logical support from the hypothesis that many co-occurrence errors seem to be pre-grammatical, involving a failure on the part of the writer to channel a partially formed idea through the grammatical component of his sentence generating device.

Total Errors

Table 9 shows initial (adjusted) and final frequencies of Total Errors. The control class reduced errors by 46.63% and the experimental class by 80.86%. As in the case of both Class 1 and Class 5 Errors, statistical analysis of Total Errors does not yield unambiguous results. Significant differences between initial and final scores and control and experimental scores (.01, .01) are not supported by significant interaction scores. There is, however, strong support for forming an extra-statistical conclusion attributing the greater change of the experimental class to the study of the grammar.

Proportions of Classes of Transformations in Well-formed Sentences

The detailed analysis of the prose samples included identification of every transformational operation in every sentence. Four data sheets were then prepared for each student (164 sheets): (1) Initial well-formed sentences, (2) Final well-formed sentences, (3) Initial mal-formed sentences, and (4) Final mal-formed sentences. Transformations were entered appropriately on each sheet in the position opposite the number of the specific transformation (1-45) and below the number representing the structural complexity score of the sentence in which the transformation occurred. Summaries were made according to the nine classes of transformations (Noun Expansion, Noun
### Table 9

**Change in Frequency of Total Errors**

<table>
<thead>
<tr>
<th>Control Class</th>
<th>Experimental Class</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial</strong></td>
<td><strong>Final</strong></td>
</tr>
<tr>
<td><strong>Initial</strong></td>
<td><strong>Final</strong></td>
</tr>
<tr>
<td>1</td>
<td>29</td>
</tr>
<tr>
<td>2</td>
<td>21</td>
</tr>
<tr>
<td>3</td>
<td>82</td>
</tr>
<tr>
<td>4</td>
<td>44</td>
</tr>
<tr>
<td>5</td>
<td>45</td>
</tr>
<tr>
<td>6</td>
<td>32</td>
</tr>
<tr>
<td>7</td>
<td>24</td>
</tr>
<tr>
<td>8</td>
<td>29</td>
</tr>
<tr>
<td>9</td>
<td>29</td>
</tr>
<tr>
<td>10</td>
<td>32</td>
</tr>
<tr>
<td>11</td>
<td>77</td>
</tr>
<tr>
<td>12</td>
<td>55</td>
</tr>
<tr>
<td>13</td>
<td>47</td>
</tr>
<tr>
<td>14</td>
<td>34</td>
</tr>
<tr>
<td>15</td>
<td>26</td>
</tr>
<tr>
<td>16</td>
<td>32</td>
</tr>
<tr>
<td>17</td>
<td>47</td>
</tr>
<tr>
<td>18</td>
<td>35</td>
</tr>
<tr>
<td>19</td>
<td>13</td>
</tr>
<tr>
<td>20</td>
<td>82</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Totals</th>
<th>815</th>
<th>435</th>
<th>-380</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>40.75</td>
<td>21.75</td>
<td>-19.0</td>
</tr>
<tr>
<td>Percent of Error Reduction:</td>
<td>46.63%</td>
<td>80.86%</td>
<td></td>
</tr>
</tbody>
</table>
Replacement, Adjective Expansion, Verb Expansion, Adverbial Replacement, Adverbial Expansion, Conjoining, Deleting, and Simple) and proportions of classes of transformations were computed. Statistical evaluation of this information by analysis of variance indicated that there was a significant difference among the classes of transformations but that there was no significant difference between initial and final scores nor between the experimental and the control classes. In other words, it seems clear that the study of the grammar had no identifiable effect on the distribution of classes of transformations. Inspection of the data sheets suggests that further investigation of the frequency changes of individual transformations should be undertaken, though such an analysis of data is presently unfeasible.
It seems clear that claims must be presented tentatively, regardless of the statistical level of significance, when the total population was limited to forty-one pupils. Even so, the persistently higher gains scores for the experimental class in every comparison made strengthens the contention that the study of a systematic grammar which is a theoretical model of the process of sentence production is the logical way to modify the process itself.

It should be observed that University School classes are most certainly atypical. Even though criteria of internal validity were adequately met through careful randomization procedures, the sampling requirements needed to meet criteria of external validity could not be adequately fulfilled. Consequently, it must be stated quite unequivocally that even though the net effect of the statistical analysis would strongly support the rejection of the null hypothesis that a knowledge of generative grammar is unrelated to change in structural complexity scores, proportion of well-formed sentences, and error reduction scores, generalizations that reach beyond the scope of the sample are purely speculative. However, any failure to meet rigorous criteria of external validity should not lead one to dismiss the
statistically significant results of an experiment in which criteria of internal validity were carefully attended to. The persistent tendency of researchers to conclude that a knowledge of grammar has no significant effect on language skills (when judgment should have been suspended) should certainly be re-examined.

Since the experiment depended on a knowledge of generative grammar, the pupils in the experimental class had to be sufficiently intelligent to understand the subject matter of the two-year program. Randomization procedures and statistical analysis presumably take into account the individual differences within and between classes; nevertheless, some account of the relative intelligence of the two classes should be helpful in any final evaluation of the experimental results. Stanford-Binet Intelligence Quotient scores were available for all experimental class pupils and all but two control class pupils. The average IQ of the control class was 115 with a range of 91 to 153; the average IQ of the experimental class was 118.2 with a range of 88 to 153. Of greater interest, however, is the apparent lack of correlation between IQ and amount of increase in proportion of well-formed sentences, as is shown in Table 10.

One further comment regarding the manner in which the generative grammar was taught seems important. The phrase structure component of the grammar was studied by the experimental class throughout the first year of the experiment. It was therefore not possible to present the transformational materials until the second year. Consequently, there was insufficient time to explore the rhetorical applications of the grammar. Any great change in average complexity
Table 10

Intelligence and Initial and Final Proportions of Well-formed Sentences

<table>
<thead>
<tr>
<th></th>
<th>Control Class</th>
<th></th>
<th>Experimental Class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initial</td>
<td>Final</td>
<td>Change</td>
</tr>
<tr>
<td>1.</td>
<td>.639</td>
<td>.811</td>
<td>+.172</td>
</tr>
<tr>
<td>2.</td>
<td>.786</td>
<td>.720</td>
<td>+.066</td>
</tr>
<tr>
<td>3.</td>
<td>.455</td>
<td>.588</td>
<td>+.133</td>
</tr>
<tr>
<td>4.</td>
<td>.750</td>
<td>.438</td>
<td>-.312</td>
</tr>
<tr>
<td>5.</td>
<td>.517</td>
<td>.633</td>
<td>+.116</td>
</tr>
<tr>
<td>6.</td>
<td>.677</td>
<td>.564</td>
<td>-.113</td>
</tr>
<tr>
<td>7.</td>
<td>.645</td>
<td>.553</td>
<td>-.092</td>
</tr>
<tr>
<td>8.</td>
<td>.717</td>
<td>.605</td>
<td>-.112</td>
</tr>
<tr>
<td>9.</td>
<td>.568</td>
<td>.667</td>
<td>+.099</td>
</tr>
<tr>
<td>10.</td>
<td>.674</td>
<td>.692</td>
<td>+.018</td>
</tr>
<tr>
<td>11.</td>
<td>.412</td>
<td>.596</td>
<td>+.184</td>
</tr>
<tr>
<td>12.</td>
<td>.488</td>
<td>.614</td>
<td>+.126</td>
</tr>
<tr>
<td>13.</td>
<td>.438</td>
<td>.620</td>
<td>+.182</td>
</tr>
<tr>
<td>14.</td>
<td>.625</td>
<td>.808</td>
<td>+.183</td>
</tr>
<tr>
<td>15.</td>
<td>.581</td>
<td>.483</td>
<td>-.098</td>
</tr>
<tr>
<td>16.</td>
<td>.613</td>
<td>.436</td>
<td>-.177</td>
</tr>
<tr>
<td>17.</td>
<td>.469</td>
<td>.605</td>
<td>+.136</td>
</tr>
<tr>
<td>18.</td>
<td>.581</td>
<td>.614</td>
<td>+.113</td>
</tr>
<tr>
<td>19.</td>
<td>.809</td>
<td>.707</td>
<td>-.102</td>
</tr>
<tr>
<td>20.</td>
<td>.452</td>
<td>.765</td>
<td>+.313</td>
</tr>
<tr>
<td>21.</td>
<td>.529</td>
<td>.750</td>
<td>+.221</td>
</tr>
</tbody>
</table>
scores or in distribution of either classes of transformations or individual transformations would quite possibly have required more time.

Once the limitations of the study have been clearly established, the following conclusions seem justifiable:

1. A knowledge of generative grammar enables students to increase significantly the proportion of well-formed sentences they write.

2. Statistical analysis suggests, but does not prove, that there is a relation between a knowledge of generative grammar and an ability to produce well-formed sentences of greater structural complexity. Because the experimental subjects increased the average complexity scores in well-formed sentences to a greater degree than did the control subjects, and because the control subjects increased the average complexity scores in mal-formed sentences to a greater degree than did the experimental subjects, there is a strong inference that it was the knowledge of the generative grammar that enabled the experimental subjects to increase the complexity without sacrificing the grammaticality of their sentences.

3. When rigorous criteria of well-formedness are applied in the analysis of writing samples, results show that almost half of the sentences written by the ninth graders were mal-formed. This finding runs counter to the wide-spread contention of the structural linguist, who is not concerned with well-formedness as a grammatical goal, that children have acquired virtually full command of the grammar of
English at an early age. The more likely contention is that the grammar of English is never fully mastered.

4. A knowledge of generative grammar can enable students to reduce the occurrence of errors in their writing.

Implications for further study:

1. The dramatic changes in the writing of the experimental class strongly support the contention that a generative grammar does in fact represent the process of sentence formation. This contention is receiving considerable empirical support in current psycholinguistic research. Further research in psycholinguistics and in the teaching of generative grammar may make it possible to identify not only a clearly defined set of psychological operations that have relevance to the composing process but also an analogous set of logical descriptions that would provide a significant structure for composition programs. At the same time it might also be possible to identify sets of grammatical mis-operations that characterize the writing of children at different age levels. A scale of expected compositional behavior for children of different ages could be constructed by using a detailed analytical device of the sort described in this study. The explicit description of grammatical operations and mis-operations could then provide a basis for developing packages of compositional materials to be used at the different grade levels.

2. The use of transformational theory in developing instructional units for the experimental class focuses concern on the well-formedness or grammaticality of written sentences. Those analyses
which list or identify all grammatical structures without distinguishing well-formed from mal-formed sentences--models from structural linguistics, for example--do not really provide the composition teacher with useful characterizations of grammaticality.

3. This analysis of prose made use of an instrument that identified forty-five transformational operations for producing sentences. The more precise the analytical instrument, presumably the more precise the description of writing will be. The corollary suggests that those attempts to relate maturity of written expression to a single index--like sentence length, clause length, frequency of subordinate clauses--are not likely to produce valid estimates of writing maturity, let alone precise descriptions of the writing.

4. Generalizations beyond this limited sample must be thought of as speculations. Nevertheless, it seems clear that this study provides a strong motivation for systematically investigating such speculations. More immediate answers are needed to such questions as the following:

(a) Could this study be replicated in communities which differed culturally and economically?

(b) Could generative grammar be taught in the elementary grades?

(c) If a class had more time to make systematic applications of the generative grammar to rhetorical matters would there be greater differences in Initial and Final Gains Scores? The development of more economical methods for presenting a generative grammar to students clearly indicates that a pedagogically complete generative grammar could be taught in much less than two academic years.
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