A GENERATIVE-TRANSFORMATIONAL SKETCH OF PORTUGUESE SYNTAX: A COMPUTER MODEL

by

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B.A., Simon Fraser University, 1969
M.A., Simon Fraser University, 1971

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY
in the Department of Linguistics

We accept this thesis as conforming to the required standard

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January, 1974
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ABSTRACT

This dissertation presents a grammar for the description of the principal syntactic structures of Portuguese in the general linguistic framework of generative-transformational theory.

The grammar is a device which defines the semantically interpretable deep structure and the graphemically interpretable surface structure for a set of Portuguese sentences. When a human being hears an utterance, he uses his knowledge to understand it. This requires not only grammar but also his knowledge of words, the context of the sentence, and most important, his knowledge of the subject matter.

To write a computer program which understands natural language, we need to understand what language is and what it does. Language can be approached as a set of mathematical rules and symbols, or as a system intended to communicate ideas. Language can also be viewed as a process of transforming a structure of concepts in the mind of the speaker into a string of sounds or written symbols, and back into concepts in the mind of the hearer or reader. In order to talk about concepts we must understand the importance of mental models. There is, of course, no way of actually observing the internal workings of a person's mind.

The process of understanding a sentence has to combine grammar and reasoning in a closely interrelated manner. A computer model is not a detailed psychological theory of how a person interprets a language,
but the present study reveals that there may in fact be a high level of isomorphism between the theory of language, the computer grammar and the individual's language.

The first part of this dissertation presents a review of the current state of linguistic theory and a practical application of transformational grammar as a methodological preliminary. This survey is necessary in order to explain the adoption of certain principles which will serve as a theoretical framework for my Portuguese grammar. The examination of this body of theory also justifies the adoption or rejection of certain principles that underlie my conception of a formalized model of linguistic description. In presenting a description of the formal model of a grammar and the generation of its syntactic structures I examine the properties of different generative-transformational systems. The formal model, based on many aspects of linguistic theory, is a priori but testable against empirical phenomena. It has the features of a metalinguistic representation of linguistic elements and classes, with a mathematical, logical and linguistic notational system of operators and operations. This generative-transformational model is non-exclusive in that its formal postulates and operations include Boolean classification, in the sense that its symbols are elective.

The computer model consists of a grammar format and algorithm for deriving sentences. The features of the model and the system include a formal description of the syntax of transformational grammar, a phrase structure scheme, a format for the lexicon and lexical insertion algorithm, and a language for specifying the traffic rules of the grammar.
The model presented in the thesis has been shown to have the capacity to generate grammatical sentences. It is also able to predict phenomena in non-deviant expressions and to ascribe to them a structural description. The formalization of the syntactic rules of this model has been tested and verified with the help of an adaptation of J. Friedman's computer program.
To

Kal J. Holsti

because

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ACKNOWLEDGMENTS

I am most grateful to Mary Moran Nanson, formerly at the University of British Columbia, for her endless hours of work and collaboration in implementing my grammar on the computer program. I am also indebted to Dr. Yves Ch. Morin, at the University of Montreal, for the enlightening explanations on the formalization of my grammar and its implementation on the computer.

I should like to express my thanks to Professor Gary D. Prideaux, at the University of Alberta, for reading this dissertation at various stages and making many helpful comments; and to Professor D. W. Reed, at the Northwestern University and Professor F. B. Agard, at Cornell University, for their critical assessment of the final manuscript. Finally, I want to thank Heather Troche for typing a very difficult manuscript with efficiency and good humour.
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## Introduction

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INTRODUCTION

This study presents a grammar for the description of the main syntactic structures of Portuguese in the general linguistic frame of generative-transformational theory.

The work has three interrelated purposes. I start with a review of the current state of linguistic theory. The survey is necessary in order to explain why I adopt certain principles that will serve as the theoretical framework for my Portuguese grammar. The examination of this body of theory also justifies, more generally, the adoption or rejection of certain principles that underlie my conception of a formalized model of linguistic description.

I want, second, to present a description of the formal model of a grammar and the generation of its syntactic structures. My formal model, based on these aspects of linguistic theory, is a priori, but testable against empirical phenomena. It has the common features of a metalinguistic representation of linguistic elements and classes, with a mathematical, logical and linguistic notational system of operators and operations. My generative-transformational model is non-exclusive in that its formal postulates and operations include Boolean classification, in the sense that its symbols are elective. The model presented in the thesis has been shown to have the capacity to generate grammatical sentences. It is also able to predict phenomena in non-deviant expressions and to ascribe to them a structural description.

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Finally, I implement my grammar model to a computer program in order to test and verify the formalization of its syntactic rules. The computer model adopted is the computer system for transformational grammar devised by J. Friedman. This computer model consists of a grammar format and algorithm for deriving sentences. The features of the model and the system include a formal description of the syntax of transformational grammar, a phrase structure scheme, a format for the lexicon and lexical insertion algorithm, and a language for specifying the traffic rules of the grammar. Adaptation of my grammar to the computer program was completed at the Statistical Centre of the University of British Columbia. The program was successfully run on the IBM 360/67 of the University's Computing Centre.

It is not my intention to review previous grammars of Portuguese because they are mostly written in a traditional theoretical framework. My ultimate aim is to write a pedagogical grammar of Portuguese. For that purpose, the present study is necessary as background research.

Portuguese data are drawn from my own native speaker's competence of the standard dialect of Lisbon. The spelling of Portuguese is according to the 1973 treatise of Academia Lusó Brasileira de Letras.

This study is organized in the following manner. The first two chapters, as a methodological preliminary, deal with aspects of the theory and practice of transformational grammar. They present an interpretative survey of the theory of generative-transformational grammar from its origins to the present.

Chapter three sets out the reasons governing the choice of descriptive methods, and examines the properties of different generative-
transformational systems. This procedure is a necessary preliminary to postulating the formalities of the model which will be used in constructing my Portuguese grammar.

Chapter four concerns the model. It begins with an explanation of the notation system which will be used in the model. The discussion will also provide precision in the formalization of the syntactic description. The chapter, finally, describes and comments on the base rules and the syntactic properties which compose the lexical structure.

Chapter five treats the transformational component. It discusses the organization of the transformations and the cyclic order. The transformational component consists primarily of a set of transformations, but it also contains traffic rules that specify the order in which the transformations are applied. The cycle is used to group transformations into ordered sets and to apply transformations individually, by set, once, or repeatedly.

Chapter six discusses the adaptation of the Portuguese grammar to the computer program. It explains the notation, which is a system described in a formal metalanguage, and presents the modified and finalized form of the Portuguese grammar commenting on the innovative theoretical approach. It describes the following parts of the grammar: phrase-structure, lexicon, and transformations. The complete version of the grammar is presented in Appendix A.

This grammar is a device which defines the semantically interpretable deep structures and the graphemically interpretable surface structure for a set of Portuguese sentences. When a human being reads
or sees a sentence, he uses knowledge to understand it. This includes
not only grammar, but also his knowledge of the subject matter. To
write a computer program which understands natural language, we need
to understand what language is and what it does. Language can be approached
as a set of mathematical rules and symbols, or as a system intended to
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grammar and reasoning in a highly interrelated manner. A computer model
is not a detailed psychological theory of how a person interprets a
language, but my work reveals that there may in fact be a high level
of isomorphism between theory, the computer grammar, and the individual's
language.
CHAPTER 1

GENERATIVE-TRANSFORMATIONAL GRAMMAR

INTRODUCTION

The first chapter presents an interpretation of the theory of transformational-generative grammar. The most important aspects of the transformational school are presented chronologically.

I. ORIGINS OF GENERATIVE-TRANSFORMATIONAL THEORY

This section examines the linguistic principles, notions, concepts and some of the weaknesses of generative-transformational theory from its beginnings up to 1965.

A. Generative Grammar

The notion of generative grammar is based on the hypothetical analogy of language and formal system. The concept of formal system can be traced to Aristotle's logic, to Euclid's axiomatic theory and to Leibniz's idea of formal operations in calculus. Boole's discoveries and works established an independent domain for formal systems under the classification of "logic" or "mathematical symbolic logic." These formal systems have been used for the axiomatization of theories in
several sciences, and their application to natural languages has helped avoid the imprecision usually found in the description of a language. Carnap (1934) was the first to remark that the general structure of a formal system is similar to that of a "language": "L'ensemble de signes" corresponds to the words, the "theorems" correspond to the well-formed sentences of a language, and the "axioms" correspond to the formation and transformational rules of the grammar (Carnap, 1934). Harris (1951: 372-3) was the first linguist to attempt to write a grammar of a natural language in terms of a formal system. Chomsky next developed to a very high degree the notion of formalism in a linguistic description. The notion of "generation" was borrowed from metamathematics and was used in linguistics in the mathematical sense. Carnap and Bar-Hillel then sought in formalization an answer to the problems of the description of syntax, while Chomsky (1951) insisted on the theoretical existence of an infinity of formal systems, each of which was capable of generating correct sentences. He also argued that formalization does not solve any of the problems of syntactic structures. Chomsky sought a formal characterization of generative rules.

1. Grammar and Theory

The analogy between formal system and language led Chomsky to his conception of a linguistic theory, in which the grammar of the language is also the theory of the language. A grammar in this case is like a formal system, consisting of the axiomatization of a theory, with axioms, deduction rules and theorems. If the grammar is formed on the analogy of its axioms and the rules of that language, it is analogous to the

Carnap, however, has used the terms "formation" and "transformation rules" in a different sense of the 1970s grammarians.
theory of that same language. Chomsky was thus attempting to develop a "theory of languages" or a "linguistic theory" which would be a "universal theory of grammar."

Chomsky suggested a formal theory to have three parts:

a) a discovery procedure for grammars,
b) a decision procedure for grammars, and
c) an evaluation procedure for grammars.

This diagram represents:

A theory conceived as a machine with a corpus as its input and a grammar as its output; hence a theory that provides a discovery procedure is a device with a grammar and a corpus as its inputs, and the answers "yes" or "no" as its outputs, as the grammar is or is not the correct one; hence, it represents a theory that provides a decision procedure for grammars. (1957:52)
Chomsky has argued that (a) and (b) are too high as reasonable goals. He opts for (c) and emphasizes the development of an evaluation procedure for grammars, realizing that this is the most accessible goal. The best method of achieving this is through "formalism."

2. **Recursiveness and Creativity**

The function of a formal system as a generative system is to enumerate its theorems. If we reverse the process, considering the theorems as the corpus, or as entry symbols, we may try to construct a mechanical process which is able to calculate the deduction rules and the axioms of the system. The ensemble of rules is called an algorithm. The fact that the ensemble of rules has an infinite number of outputs does not alter the precise definition of the system which is able to define the properties of this output by the mathematical notion of recursiveness. Chomsky makes the analogy between the mathematical notion of recursive functions and the corresponding properties of natural languages. The fact that each individual is able to understand an infinite number of sentences expressed in his native language and which he hears for the first time, leads Chomsky to define as "creativity" or "the creative aspect" of the language the internalized recursive functions that the speaker has learned (Chomsky, 1957). But in fact no speaker ever processes an infinite number of sentences. Rather, he has the ability to process new sentences.
3. Grammaticality and Acceptability

Chomsky (1956:52) says that each speaker has a guided intuition about the comprehension and production of a sentence. The degree of acceptability of that sentence corresponds to its degree of grammaticality. From the formal properties of a sentence and the speaker's intuitive validation of that sentence results the notion of grammaticality. This notion exists separately from the meaning of the sentence. Grammatical autonomy excludes the notion of meaning in this theory. This does not mean that Chomsky excludes the importance of semantics in a linguistic description. He does foresee the development of the theory formulated on a restricted but independent base, viz the syntactic component, a development which will allow for a further expansion, in the form of the semantic component. Grammaticality is a matter of "competence," while "acceptability" is a matter of "performance." The two are quite distinct, thus for Chomsky grammaticality determines performance.

4. Simplicity

Chomsky uses grammatical "theory" as a "theory of language" that presents a double system, one intercalated to the other, keeping the interpretation of all the terms of the metalanguage used in the description of the same language. The notion of "simplicity" is based on the notion of "elegance" in a formal system or in a mathematical demonstration. Economy is applied to the form and number of rules, and to the degree of condensation of rules which meet the adequacy criterion of predictability. The simplest grammar is chosen on an empirical basis. The principle of "simplicity" corresponds to Hjelmslev's
conception (1943-1968:33) that grammar is the theory of a language, or a representation of the language, which is part of a linguistic meta-theory. Grammar as a theory or model has many possible representations. The criterion of simplicity will help choose the most elegant model. The choice is empirical and is used uniquely to compare grammars and not as an epistemological principle of a universal value. The "simplicity" concept is most valuable when comparing grammars and does not carry other implications as in other domains (Chomsky 1970:4). Also, Chomsky equates "simplicity" with capturing linguistically significant generalizations: i.e. the "intuitions" of native speakers. Thus, the evaluation measure is supposed to have empirical content.

B. Transformational Grammar

The notion of transformation came directly from Harris' concept of distribution (1952). Lyons (1968) points out the main differences between the concepts of transformation in Harris and Chomsky.

1. Harris' Transformation

Harris, one of the most important linguists of the American structuralist school, developed a linguistic analysis centred on the classification of elements according to their distributional properties. In Structural Linguistics (1951) we are presented with Harris' system. Though not yet well defined by Harris, the transformation emerges as

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2 Although I recognize Harris to be the originator of the whole notion of transformation and his more recent notions of transformations
an operation which produces a structural change while keeping its grammatical function. The main characteristics of Harris' transformation are the following:

1) It is a bi-directional and symmetric relation;
2) It establishes the relation between the nucleus and the other elements of the sentence;
3) It does not change the meaning:
4) All transformations are optional;
5) Transformations can apply to parts of sentences.

2. Chomsky's Transformation

Chomsky, who participated in the research of Structural Linguistics (Harris: 1951), saw the limitations of Harris' system, and his own research on discourse analysis lead later to the precise notion of transformation.

Chomsky's major original contribution to the concept of transformation which he borrowed from Harris, is the importance he gave to it in a formal system. Chomsky is concerned with the formal properties of the transformation, and in formalizing it, he defines and interprets it in a different way:

1) The transformation is integrated into a generative system. It works from axiom to theorem; therefore, the order of the operations is linear. One structure substitutes for another; a member of the equation is a derivation of another member.

as operators exposed in The Mathematical Structure of Language (1968), it is not my intention in this study to discuss Harris' work.
2) Chomsky orders his structures in the formal system, allowing intermediate or non-terminal structures to which obligatory transformations will apply.

3) Some of the transformations are obligatory and others are optional.

4) "Sentence" is established as a maximal unit of analysis, i.e. transformational grammars are sentence grammars.

5) The formalization of transformation is similar to the concept used in logic by Carnap (1934:28) "A transformation rule formulates the conditions which derive one sentence from another."

6) Chomsky bases the transformation concept on the creative property of the grammar of a natural language.

C. Chomsky and the History of Linguistics

In an attempt to construct his theory, Chomsky uses the kind of logic that is similar to metamathematics or metalogic, while Bar-Hillel, Carnap, and others, use mathematical-logical concepts in linguistics. He also proposes the existence of a "cartesian linguistics" defined in terms of an "innate" philosophy taken from Descartes. The notions of "deep structure" and "surface structure" are borrowed from the "Port Royal" grammarians, and the notion of creativity of language is borrowed from Humboldt.

1. Structuralism

Chomsky detaches himself from structuralism and opposes the North American neo-Bloomfieldians, glossematics, the Prague school and
its diverse outgrowths, the functional school of Martinet, and the Firthian school and its developers. To be sure, Chomsky has taken some ideas and concepts from each of these linguistic schools, but as remarked by Hockett (1968:36):

Chomsky has been constructing an elaborate and coherent theory of language which differs startlingly from any proposed by linguists or philologists, or by psychologists or philosophers, during the last hundred years or more. By moving away from the rest of us at a wide angle, Chomsky has achieved a different perspective . . .

In brief, Chomsky has created a whole new linguistic school. He has initiated a new period in the history of linguistics, as Ferdinand de Saussure separated himself from the neo-grammarians and created what became ultimately the structuralist school.

Nevertheless, Chomsky has confirmed his indebtedness to structuralism (1970:57), and the preoccupations revealed in his research place him in the context of the neo-Bloomfieldian American school. The similarities between Chomsky's principles and those of the neo-Bloomfieldians have the following in common [Hockett (1968:31-2)]:

1) The conception of language as a "rigid" system;

2) The notion of a grammar based on the conception of "distributional segmentation" from the phonological model;

3) The idea that grammar and semantics should be separated.

These principles are at the root of Chomsky's linguistic theory. In terms of these principles he is a neo-Bloomfieldian and is opposed to the Firthians, who are oriented to situational contextualization, and to the functionalists who focus on language as a communication system. However, Chomsky develops a radical change of methodology because he
treats linguistics not as an analytical, empirical and taxonomic science, but as a formal deductive and experimental science. One of Chomsky's main goals in constructing his theory is to demonstrate the limitations of the structuralist methods. Structural grammars were unable to account for all the sentences of a language and to provide them with a correct structural description, and, further, ambiguous sentences could not be clarified in an adequate manner.

D. Transformational-Generative School

The principles of a new linguistic school were outlined in the preceding paragraphs. These principles allow a double purpose: the axiomatization and evaluation of grammars and then the formulation of a model.

1. Syntactic Structures Model (1957)

Syntactic Structures, a condensed review version of some parts of Chomsky's doctoral dissertation, exposes the following principles of a new linguistic theory.

1) The creative aspect of a language needs a recursive process, which is conceived as an attribute of the transformation.

2) The concept of grammaticality must be realized at four levels:
   a) the transformational level,
   b) the syntactic level,
   c) the morphological level,
   d) the phonetic level.
3) The concept of simplicity needs a formal notation, to realize all the rules of the grammar, which are of two types:

a) Phrase-structure rules:

1. Formation - \( xAy \rightarrow xZy \)
   where \( A \) is a unique and non-null element and \( Z \) is a series of elements components of \( A \) or a set of members of the class \( A \).

b) Transformational rules:

1. Singular - This type of transformation is applied directly to the kernel and it implies one of the four operations: adjunction, ellipse, substitution and permutation. These operations may be symbolized as follows:

   \[ x_1 + x_2 + x_3 + x_4 \rightarrow x_1 + x_2 + x_3 + x_4 + x_5 \]  
   (adjunction)

   \[ \rightarrow x_1 + x_2 + x_3 \]  
   (ellipse)

   \[ \rightarrow x_1 + x_2 + x_3 + x_5 \]  
   (substitution)

   \[ \rightarrow x_1 + x_3 + x_4 + x_2 \]  
   (permutation)

These transformations are obligatory or optional and are ordered.

2. Generalized - These transformations group two kernels into one sentence: from two structural descriptions will result one sentence.

The notation used in a generative grammar is as follows:

\[ \rightarrow \text{rewrite} \]

\((x)\) optional
∅ zero element
# word boundary
\{x\} either one element
\{y\} x or y

The structural description has the form of a phrase-marker, represented by labelled brackets. The nodes of the phrase-marker correspond to the labelled brackets. The grammar presents this general form:

\[ E : \text{sentence} \ldots \text{Axiom} \]
\[ x_1 \longrightarrow Y_1 \quad \text{Phrase-structure} \]
\[ x_2 \longrightarrow Y_n \]
\[ T_i \quad \text{Transformational structure} \]
\[ T_n \]
\[ Z_i \longrightarrow W_i \quad \text{Morphophonemics} \]
\[ Z_n \longrightarrow W_n \quad \text{Transformation and Rules} \]

II. CONTROVERSY OVER CHOMSKY'S THEORY

The comments presented here will focus on five major topics. First, some methodological problems and some psycholinguistic objections are discussed. Then, there follows a discussion on the status of autonomous syntax and its relation to semantics. And finally some technical problems of the 1957 model, and criticisms of inadequate grammars are presented here.
A. Methodological Problems

Some linguists have questioned the scientific validity of Chomsky's theories. Voegelin (1958:229-31) asks how Chomsky has worked out his theory on a basis of the facts of language. Halliday (1962) questions the role of intuition in his research. Dixon (1963:1.1-3.3), who has defined "science" as "a notion which recognizes structures from observations," cannot accept seriously a theory which creates facts from arbitrary structures. The French functionalist Martinet (1968:xii) remarks:

En face de constructions qui ne s'appuient sur aucune observation objective du comportement linguistique des sujets parlants, qui se fondent sur des a priori qu'on ne cherche même pas à justifier . . .

and François (1968:176)

... la linguistique peut être aussi expérimental que descriptive. En revanche, elle ne peut être ni déductive au sens où l'est la logique, ni fondée sur l'introspection.

These criticisms are based on an "empirical" point of view and are directed to a fundamental "philosophical" aspect of Chomsky's methodology, namely the problem of inductive versus deductive procedures in the construction of a science.

1. Induction-Deduction

Chomsky has presented convincing arguments showing the weakness and the inadequacy of the structuralists' methodology, which include their inability to account for linguistic structures produced by
transformations, the lack of explicitness, which would account for the creative aspect of language, and the lack of formalization, simplicity and exhaustiveness in the model.

Some structuralists react in a hostile way against the demonstration of the inadequacy of their methodology. They interpret this demonstration as an attack on the inductive method as such, and have reacted by attacking Chomsky's deductive method.

Once this controversy is stated, it must be said further that Chomsky has not explicitly tried to demonstrate the inadequacy of the inductive method. The structuralists have not tried, as remarked by Postal (1964a), to refute the proofs of the inadequacy of their methodology on the linguistic level. Some of Chomsky's followers have fallen into the structuralists' trap in the process of demonstrating the inadequacy of the inductive method. Recourse to the facts and the existence of some nondefined axioms are present both in Chomsky's approach and the structuralists' approach. In my opinion, a comparison of both approaches on the philosophical level gives Chomsky a superior position on the linguistic level.

2. Intuition

Chomsky's critics demonstrate a certain misunderstanding about some aspects of his theory. Halliday points out that Chomsky (1962:2-11) uses the term "intuition" in four different ways. Intuition is thus interpreted as:

a) the knowledge of the listener which enables him to recognize a given structure belonging to a given language;
b) the speaker's knowledge of the grammar, enabling him to recognize the structures of sentences at different levels;

c) a methodology which formalizes structures independently of a theory of the ensemble of the language;

d) axioms of the structure of a language.

Chomsky's position is that intuition means the axiomatization of the structures of a language. Axiomatization is an analogy between language and formal system. The verification of the exactness of this analogy consists in the correspondence between the notion of acceptability and the formal notion of grammaticality. The notion of grammaticality is possessed by the theoretician himself, which is a factor of his intuitive knowledge of his language.

The existence of these intuitive notions is a hypothesis that can be accepted or rejected. If the hypothesis is rejected, then the hypothesis of language as a well-defined system has to be rejected as well.

3. Hockett's Criticisms

Hockett is the only linguist who has analysed Chomsky's theories and concluded that language was an ill-defined system.

In The State of the Art (1968), Hockett synthesizes his criticisms of Chomsky's theories and places transformational theory and his point of view in the context of general linguistics in North America. A brief summary of Hockett's arguments is presented here.
4. An Ill-defined System

Hockett as a disciple of Bloomfield follows the latter's path in considering linguistics as an autonomous science. Hockett applies the rigour of the phoneme principle to the other linguistic domains, such as morphology and syntax. This direction created the linguistic movement known as "distributional school" with its diverse subdivisions, based on three important principles:

a) Language is a rigid system;

b) The model for a grammar must have the form of "item-and-arrangement"; this form of analysis is called "immediate constituents";

c) Sematics and grammar are independent of each other.

Hockett's criticisms focus on the first principle of the distributional school which accepts language as a well-defined system. He comments:

A well-defined system is any system (physical, conceptual, mathematical) that can be completely and exactly characterized by deterministic functions . . . By a deterministic (or well-defined) function we shall mean any function subsumed by the stated frame of reference; that is, any function computable in any of the several precise senses of that term developed in the theory, but also any function that is specified with sufficient explicitness that its noncomputability can be proved within the theory.

According to these definitions, any system subject to a constant change, such as a physical system or a language system, belongs to the category

3"Item-and-arrangement" is a Bloomfieldian term used in opposition to the term "item-and-process" (Pike, 1967:545-564)."
of ill-defined systems. Hockett points out that Chomsky's mistake was to consider language as a well-defined system. Therefore Chomsky's attempt to construct an algorithm is ineffectual.

The weakness of Hockett's argument appears in his attempt to reverse the principles of modern linguistics and substitute for them the principles of the Neogrammarians.

Saussure (1966:117) defines synchrony as "un état de langue," and claims that the notion of synchrony "ne peut pas être qu'approximative" (ibid: 143) because all the synchronic systems "sont aperçus par une conscience collective" (ibid:140). Language is a social abstraction phenomenon but it is the individual's realization that constitutes the system, for both Saussure and Chomsky.

If Hockett does not accept the distinction between a system of things and a system of ideas, he cannot accept Saussure's distinction. Hockett thus refuses to acknowledge the existence of language. The fact that language is a changing linguistic phenomenon, according to Hockett, proves that language is a physical system, and therefore it is ill-defined. This conception was already formulated by Saussure with respect to parole, "la parole fait évoluer la langue " (ibid:37).

In this perspective Hockett is wrong to consider language as a solely spatio-temporal system, instead of accepting Saussure's opposition langue/parole at the social level, or Chomsky's opposition competence/performance, at the psychological level.

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4 Chomsky and Halle (1968:249-289) and Kiparsky (1968) have formulated a possible mode of incorporating this notion in a transformational theory.
B. Psycholinguistic Remarks

We will cite some remarks made after *Syntactic Structures* on the link between the transformational model of linguistic intuition, and the problem of the psychological reality of grammar. Halliday (1962-1964) points out that Chomsky's school takes a single direction and cannot account for actual mental processes. The mind generates sentences as a "transmitter" but also analyses them as a "receiver." Uhlenbeck (1963:1-18) and Dixon (1963) argue that the operations needed by a transformational grammar must correspond to real psychological operations. The psychologists of the Behavioralist School see Chomsky's theories as based on an innate conception of language. Transformational theories exist independently of the innateness hypothesis, which belongs to the domain of psychology. Halliday and Uhlenbeck have objected to Chomsky's theory on the grounds that its aim is to reproduce the psychological operations required by sentence formation in a language.

But the aim of Chomsky's model is to develop a symbolic mechanism to represent language, not to explain language. Chomsky does not try to describe how the sentences S1,...,Sn are constructed. He wants to determine, rather, the best symbolic way for the representation of sentences. In *Syntactic Structures* he points out that a system of rules is insufficient to account for a linguistic system. A system of context-free rules: $X_1 \rightarrow Y_1$, or a system of context-sensitive rules: $ZXW \rightarrow ZYW$, is incomplete. We need the transformational system for a more efficient account of grammatical complexity. This is Chomsky's claim. His objective never has been to produce a grammar which accounts
for the mental processes that produce the sentences. The psycholin-
guistic objections to Chomsky may be important, but Chomsky cannot be
criticized for failing to do what he never intended to do. In Aspects
(1965:139-140) Chomsky states his position:

Such a description of the form of the syntactic component
may seem strange if one considers the generative rules as
a model for the actual construction of a sentence by a
speaker. Thus it seems absurd to suppose that the speaker
first forms a generalized Phrase-marker by base rules and
then tests it for well-formedness by applying transfor­
mational rules to see if it gives, finally, a well-formed
sentence. But this absurdity is simply a corollary of the
deeper absurdity of regarding the system of generative rules
as a point-by-point model for the actual construction of a
sentence by a speaker. Consider the simpler case of a phrase
structure grammar with no transformations (for example, the
grammar of a programming language, or elementary arithmetic,
or some small part of English that might be described in
these terms). It would clearly be absurd to suppose that
the "speaker" of such a language, in formulating an "utterance,"
first selects the major categories, then the categories into
which these are analyzed, and so forth, finally, at the end
of the process, selecting the words or symbols that he is going
to use (deciding what he is going to talk about). To think
of a generative grammar in these terms is to take it to be a
model of performance rather than a model of competence, thus
totally misconceiving its nature.

This explanation should help clear up any confusion among non-transfor-
mational linguists. However, Chomsky has also claimed that any perfor-
mance model would have to incorporate a generative grammar as an essential
component. How then would the transformational rules be interpreted?
There is no easy answer to such a question and Chomsky's quote sheds no
light on the problem of the psychological reality of grammar.
1. Genetic Psychology

Chomsky's "innate" hypothesis has also been the centre of criticism by Piaget in *Le Structuralisme* (1968). Chomsky had suggested that the origin of linguistic structures in human beings could be explained, by social activity formation, or by heredity. Piaget interprets this as a system of "auto-rules" or the internal-equilibrium of structures,

> ... les structures humaines ne partent pas de rien et si toute structure est le résultat d'une genèse, il faut résolument admettre, au vu des faits, qu'une genèse constitue toujours le passage d'une structure plus simple à une structure plus complexe ... (1968:54)

It would seem that linguistic structures are not innate; the only innate characters are the intellectual ones which produce linguistic structures; as Piaget (1968:76) says, it is possible to

> ... rendre inutile l'hypothèse de l'innéiste tout en conservant l'ensemble du système explicatif de Chomsky ...

which means that the innate hypothesis, the typology of universals hypothesis, and even the form of the model, are basic concepts in Chomsky's theory.

C. Autonomous Syntax: syntax and semantics

A major criticism of Chomsky's theory is that syntax remains autonomous within the system. The Firthian school proposes binding syntax with the context, the situation, and with the meaning of the utterance, where each sentence must be interpreted by all the extra-linguistic facts. But Bloomfield (1933) objected to this approach
because it presupposes a classification of all possible contexts of situations. Chomsky proposes a more modest task; first, a syntactic theory, followed by a semantic theory. In *Syntactic Structures* he centres the autonomy of syntax on the notion of grammaticality. The validity of grammaticality has been extensively debated by linguists. Some linguists tried to establish the opposite view, namely that of no syntax without semantics. Hill (1961), particularly, makes up tests which would force the informant to say "yes" or "no" to Chomsky's sentences, to verify all the sentences which Chomsky uses, and comes up with different criteria for the grammatical, semi-grammatical and non-grammatical sentences, which makes him conclude that the notion of grammaticality is totally arbitrary and subjective. Hill seems unable to accept a syntax with semantics. But these tests are not of a scientific nature, and force the informants to use semantics. Jakobson (1963) tries also to point out a certain degree of ungrammaticality in Chomsky's sentences. In these sentences Chomsky himself had already established the concept of degrees of grammaticalness, and had even established a hierarchy of grammaticality. Dixon (1963) criticizes the concept of "grammatical intuition" of the speaker which reflects his cultural environment and is part of his formal school education. Chomsky's proposal on the independence and autonomy of syntax has aroused a series of objections, because linguists interpreted this as a refusal to treat the various problems in semantics, or not to treat semantics at all.

Halliday, Dixon, Lyons, Uhlenbeck, and others have also criticized Chomsky's omission of the treatment of "lexis" in his theory.

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5"Lexis" is a term from the Firthian school which covers all the aspects of the internal structure of the lexical elements; it is used in opposition to 'grammatical unit.'
Yet, the lack of special treatment of semantics does not exclude semantics from his theory. In *Syntactic Structures*, he mentions at several points the need to develop a semantic theory in which syntactic structures would play the main role (Lees, 1957:393). Katz and Fodor (1963) follow up *Syntactic Structures* and try to develop a semantic theory.

D. **Problems of the Syntactic Structures Model**

The technique of analysis is based on the concepts of traditional grammar and on Aristotelian logic. Chomsky chooses an analysis of type (a) because he can label the nodes with the traditional classes of the noun-phrase (NP) and the verb phrase (VP), but not an analysis of type (b) (Uhlenbeck, 1963). Chomsky, however, does not use the labels NP and VP traditionally, i.e. VP equals predicate in traditional grammar.

a) *O Manuel compra casas.* (Manuel buys houses.)

\[ O \text{ Manuel compra casas.} \]

\[ O \text{ Manuel compra casas.} \]

\[ S \]
\[ \text{NP} \quad \text{VP} \]
\[ \text{Det} \quad \text{N} \quad \text{V} \quad \text{NP} \]
\[ \text{Det} \quad \text{N} \]
Lyons (1958-1966) has suggested an improvement over Aristotelian logic as a basis for deep structure analysis which would be to formalize the syntactic structures on the structure of predicate calculus, and would produce a syntactic grammar as follows:

a) A graphic representation:

\[ S \rightarrow F(X, Y) \]
\[ F \rightarrow V \]
\[ X \rightarrow NP \]
\[ Y \rightarrow N \]

b) A transformation:

\[ F + X + Y \rightarrow X + F + Y \]

This approach has been taken up by several transformationalists and has provided the bases for at least three versions of linguistic approaches:

**compra Manuel casas**

**Manuel compra casas**
1) The generative grammar of Šaumjan (1965);
2) The case grammar of Fillmore (1968);

A brief examination of Šaumjan's theory is presented here.⁶

E. Šaumjan's Applicational Generative Model

The most serious adaptation of Chomsky's model is the one presented by Šaumjan, with its modifications:

1. The goal of a generative grammar is not to generate the correct sentences of a language, but to generate the "ideal structures" of an "ideal language," of a so-called "genotype language." The formulation of the correspondence rules would allow the transformation of the objects of a genotype language into objects of a natural language, a "phenotype language."

2. The logical structure of a grammar would follow the structure of the systems characterized by an unique binary operation, called an "application." Thus, this model takes the name: "Applicational Generative model."

3. The application is defined in the following terms: "If X is an object and Y is an object, then XY is an object."

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⁶ In the formulation of my grammatical model I have accepted Šaumjan's conception of deep structure and originally wanted to use a deep structure similar to predicate calculus, but for practical reasons I have recognized, in deep structure, the traditional functions of subject and predicate. My conception of deep structure is a compromise between the Aristotelian logic and predicate calculus.
4. Šaumjan's model consists of four generators:

a) The first is an abstract generator, which generates abstract elements, the "semions" or elementary semiotic units, forming "bundles" and "episemions" of semiotic type to which belong the "bundles of semions." In a phenotype language the bundle of semions corresponds to categories (noun, verb, etc.) which are the elements of any operation. Therefore, they are the "operators"; the "episemions" are classes of constituents (noun-phrase, verb-phrase, etc.). The bundles of semions are generated by axioms according to the following four operations:

1) iteration, 2) reduction, 3) conversion, 4) connection.

The abstract structures are represented at two levels:

1) Generator of words, 2) Generator of sentences.

The transformational generator generates at the sentence level all the syntactic correspondences which can exist for a given semiotic structure. Thus at the level of a phenotype language we can obtain a sequence such as "mountain-high" and transformations yield strings like "the high mountain" and "the height of the mountain." The formalizations of the correspondences between a genotype language and those of a natural language will be rules of correspondence which will provide a theory of the typology of languages. Šaumjan's theory of universals requires the formalization which he proposes. The main differences between Šaumjan's system and Chomsky's are that Šaumjan proposes:

1) A more abstract level of deep structure;

2) A difference between morphology and syntax.

The only objection to Šaumjan's theory of universals is that it
presupposes an analysis of Chomsky's type. Otherwise it would be impossible to compare the phenotype language with the genotype language in order to infer the correspondence rules. Šaumjan's deep structure conception is a universal deep structure. It is not identified with any language in particular, nor with any group of languages.7

F. **Criticism of Inadequate Grammars**

One of the aims of transformationalists has been to justify their contention that other grammatical theories are inadequate. Chomsky in *Syntactic Structures* has proven the insufficiency of finite state models and immediate constituent grammars. For this, he has used formal criteria, such that a model with finite states cannot generate certain structures, which are frequent in natural languages, such as discontinuous elements, "or . . . or," "if . . . then," and others. An IC grammar cannot account for these structures either, except very clumsily. The criterion of simplicity of the transformational model makes evident the failure of these grammars. Postal continues Chomsky's line of research. In *Constituent Structure* (1964a) Postal points out eight failures of an IC theoretical grammar:

7 In adapting Šaumjan's modification of Chomsky's model to the syntactic description of Portuguese, I use predicate calculus to postulate a quasi-universal deep structure, a level of deep structure which is relevant to more than one particular language or group of languages.
1) An IC grammar often gives an incorrect syntactic structure; as for example, Wells treatment of coordination (1947).

2) The structural description of a sentence often requires a series of syntactic indices, and the IC grammar is only able to provide one. The classical example of discontinuous elements is 'to pick up the parcel' and 'to pick the parcel up.'

3) An IC grammar inefficiently meets the simplicity criterion; for example, it fails to treat efficiently the phenomenon of agreement.

4) IC grammars do not account for the notion of 'grammaticality.'

5) An IC grammar does not account for the structural relatedness between sentences, such as active-passive, declarative and interrogative, affirmative-negative.

6) An IC grammar does not construct the structure of the sentence. Longacre (1964) and Breud (1968) have tried to do this, but end up in systems far removed from the required level.

7) The structural descriptions in IC grammars do not correspond to the criterion of simplicity of the theory. (The description is not always the most simple one.)

8) The cross-classification treatment of the grammatical categories is too complex. Postal does not present any solution in a transformational grammar. This question gives rise to various different models in the frame of the Chomskyan theory.

An IC grammar presenting only rules of the form $X \rightarrow Y$ cannot account for the grammatical structures of some languages. Any universal linguistic theory must account for the complexities of any natural language,
and must therefore have more powerful rules than those independent of context. Postal uses a uniform procedure to show the inadequacy of a variety of types of grammar in two formal demonstrations:

a) A formalization of a grammar gives only rules of the form

\[ XAY \rightarrow XZY \]

where A is a unique and non-nul symbol, X, Y, Z are sequences of symbols, Z is non-nul, A \( \neq \) Z. Their permutations are exclusive.

b) Natural languages have some structures which cannot be treated by this type of rule, and thus cannot be described by such a grammar. Using these demonstrations, Postal and others (Postal 1964a-64b, 66a, 66b), Gross (1962), Chomsky (1955, 56, 57-1969, 1964), Gaifman (1965), Robinson (1968), have pointed out the failure of the grammars of Bloch (1946), Wells(1947), Harris (1945, 46-51, 57, 62), Hockett (1954, 55, 58, 61), Pike (1964), Bar-Hillel (1953, 60a, 60b), Oettinger (1961), Rhodes (1959), Halliday (1961), Tesnière (1959), Martinet (1960) and Lamb (1962).

III. AN INTEGRATED THEORY

A. The Development of the Theory

During the period that follows Syntactic Structures (1957), up to Aspects (1965), there are two kinds of developments: precision on the theoretical level, and an expansion of the domain of the application of the theory which leads to the concretization of the semantic component and to a revision of the model.
1. The Notion of "Theory"

In *Syntactic Structures* the definition of "linguistic theory" limited the linguistic task to the evaluation of grammars. Grammatical theory is formalized for the first time. Chomsky presents this formalized theory and specifies the criteria for the formulation of a grammar. In the article "On the Notion 'Rule of Grammar'" (1961:82), he states that:

... the theory of grammar should meet the requirements of the following kind. It should make available:

a) a class of possible grammars $G_1, G_2, \ldots$,
b) a class of possible sentences $S_1, S_2, \ldots$,
c) a function $f$ such that $f(i, j)$ is the set of structural descriptions of the sentence $S_j$ that are provided by the grammar $G_j$,
d) a function $m(i)$ which evaluates $G_j$,
e) a function $g$ such that $g(i, n)$ is the description of a finite automaton that takes sentences of (b) as input and gives structural descriptions assigned to these sentences by $G_j$ (i.e. various, perhaps all members of $f(i, j)$) as output, where $n$ is a parameter determining the capacity of the automaton.

This definition of "grammatical theory" prescribes the directions of research in linguistics:

a) It implies an exact theory of the notion of rules in a grammar, leading to formal linguistic research.

b) It implies the definition of a generalized phonetic alphabet, which we can find in the distinctive feature theory of Jakobson.

c) It implies the notion of simplicity in linguistics.

d) It implies the notion of grammaticality.

e) It implies a grammatical theory, independent of the acquisition models or perception models of language, that will take the form of an algorithm.
2. "Levels of Success"

Chomsky calls the formalization of theoretical levels "levels of success" in the general framework, an ideal parallel to the notion of "levels of adequate grammars." In the theoretical frame it is possible to postulate different levels for an adequate description. The levels of adequacy in phonology, syntax, semantics, are described in *Current Issues in Linguistics Theory* (1964:28-50). Chomsky considers as a principal attribute for a grammar an adequate theory of grammaticality. The best grammar will also always be the most "simple." The formalization of these "levels of success" for a grammatical description suggests three areas of linguistic research within the general theory: grammatical rules, the phonetic alphabet, and the algorithm. These are also the three variables in a general linguistic theory. The three constants in this theory are: grammaticality, simplicity, and creativity, the latter being a universal characteristic of natural languages.

3. Competence and Performance

The distinction competence/performance is another theoretical notion which is a reformulation of Saussure's distinction langue/parole (Chomsky, 1964:52). The different terminology is explained by the fact that in adopting a Saussurian principle, Chomsky does not follow the methodology of Saussure (ibid:59-60; 1964:4). There is, however, a difference between Chomsky's and Saussure's notion which goes beyond a simple difference in terminology. There is an implicit dichotomy in the opposition langue/parole. For Saussure "langue" has a double function; it is the system of any individual and also the social norm. And "parole" is the individual's realization of his "langue." Chomsky's notion of
competence/performance comprises three functions: system/norm/parole.

The competence of the speaker-hearer can, ideally be expressed as a system of rules that relate signals to semantic interpretations of these signals. The problem for the grammarian is to discover this system of rules; the problem for linguistic theory is to discover general properties of any system of rules that may serve as the basis for a human language, that is, to elaborate in detail what we may call, in traditional terms, the general form of language that underlies each particular realization, each particular natural language.

Performance provides evidence for the investigation of competence. At the same time, a primary interest in competence entails no disregard for the facts of performance and the problem of explaining these facts. On the contrary, it is difficult to see how performance can be seriously studied except on the basis of an explicit theory of the competence that underlies it, and, in fact, contributions to the understanding of performance have largely been by-products of the study of grammars that represent competence. (Chomsky, 1966:10)

The real difference, however, between de Saussure and Chomsky is that de Saussure says explicitly that langue is the system of any individual and also the social norm (which is manifestly impossible) and Chomsky never talks about either but about the system of an idealized speaker-hearer, which is not helpful in studying the system of a real individual or real social norms.

B. Further Development of the Theory

The major development in transformational theory (1964) is to incorporate the phonological and the semantic components within a linguistic description. These two components were briefly mentioned in Syntactic Structures, but not specified. First, Chomsky considered the study of semantics to be independent of the study of grammar, but he did not exclude a semantic component from his conception of a generative grammar. He considered the mechanisms of the syntactic component as basic theoretical principles which constituted the preliminary foundations for the development of a general theory of semantics.
Katz and Fodor (1963-1966) follow up Chomsky's research on syntax. They consider *Syntactic Structures* as the background for their sketch on a theory of semantics, in an attempt to formulate the semantic component for the general transformational theory.

1. The Semantic Component

Katz and Fodor (1963-1964) present the theoretical principles in their article, "The Structure of a Semantic Theory." This work presents the first contribution to semantics in the generative transformational framework. The authors propose to integrate a semantic theory into a generative grammar. The resulting integrated theory incorporates the philosophers' approach, on one hand, and the psychologists' and the linguists', on the other, and attempts to locate the limits of semantics. The upper limit of semantics is the context of situation. This determination makes explicit that semantics is not concerned with the change of meaning from sources beyond the sentence level in a linguistic environment, or beyond the word in a situational environment. This limitation has the purpose of avoiding the problem that rises from connotation and reference phenomena. The lower limit of semantics is grammar, as stated in the controversial sub-title of the article, "linguistic description minus grammar equals semantics." The semantic component comprises a dictionary which provides several kinds of information:

   a) the grammatical categories (noun, verb ...);
   b) the semantic features or markers (in parentheses);
   c) the distinctive features or distinguishers (in brackets);
   d) the contextual features.
The famous example of Katz and Fodor (ibid:500) is reproduced here for convenience.

![Diagram of the definition of Bachelor]

This example does not show the contextual features. They are added when a word has a specialized meaning in a certain context of semantic features. One example is honest, which in the environment [+ female] takes the general meaning of virtuous plus the sense of chaste. The choice of features from the dictionary is only one stage for the meaning of the sentence. The problem is how to select among the possible combinations of features and how to reject the combinations which lack meaning. To solve this problem Katz and Fodor include in the semantic component a system of two Projection Rules. Type one interprets basic
sentences. Type two treats sentences embedded by transformational rules. The question now is to establish if the sentences resulting from transformations carry the same meaning as before the transformation, that is, whether the transformations preserve meaning or whether they add something to the sentence. The works of Lees and Klima (1963) and to a certain extent Chomsky (1957), suggest that transformations are responsible for the recursiveness in natural languages, and also for other phenomena, such as negation, interrogation, and the like. Katz and Fodor are forced to admit that transformations affect in an important way the meaning of the sentence. The Projection-rules of type-two work on the type-one, to preserve the meaning of transformed constructions, working on the output of a syntactic description (Katz and Fodor, 1964:506).

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8In Chomsky (1957), T-rules did not necessarily preserve meaning. But by 1965 he had adopted the Katz and Postal position and his rules then did preserve meaning.
Where PI, ..., P5 are syntactic categories, the Projection-rules combine the groups of possible features according to the syntactic structure. Then, in the above example, P1 + P2 and P4 + P5 become P1 + (P4 + P5) and P3 + (P1 + (P4 + P5)) as the possible interpretations of the sentence of the form (P1 + P2) + (P3 + (P1 + (P4 + P5))).

The only semantic features retained are those combinations which do not show mutual exclusion of the kind male/female, concrete/abstract.

Another aspect of that work is to elaborate a semantic "meta-theory," which can be placed in the framework of Chomsky's linguistic theory. The immediate goals of Katz and Fodor are to discover the universals of a semantic theory, followed by some evaluation criteria which will allow us to choose between two or several theories of meaning for natural languages. Katz and Fodor do not intend to describe how the listener understands the meaning of a given sentence in a given language.

The shortcomings of Katz and Fodor's work are well known and have elicited considerable criticisms, in particular by Bar-Hillel (1969), and Weinreich (1966). Katz and Fodor's basic mistake is their insistence on calculating the meaning of a semantic utterance based on Boolean conditions of analysability. Katz and Fodor's semantic theory presupposes the syntactic component of *Syntactic Structures*, which is independent of the semantic component, but which subordinates the semantics to the syntax output. Then they try to relate syntactic theory to semantic theory. This is also the goal of Katz and Postal (1964) in developing an "integrated theory of linguistic description." Chomsky states that

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9 A similar correlation takes place between syntax and phonology (Halle and Chomsky, 1968).
previous semantic schools have not taken into account the inference of syntax at the level of meaning and have covered too large a domain, trying to account for all contexts and all situations.

C. The Integrated Theory

Katz and Postal (1964) make the first attempt in transformational grammar theory to present a model which considers the three traditional domains of linguistics, the integration of the phonological, syntactic and semantic components. This model will be the focus for the comparison with post-1964 transformational developments. The main characteristics of the model are: the syntactic component supplies for each string one or more syntactic descriptions given by a phrase-marker, to which are applied the transformation rules. The phrase-marker, which is produced by the base rules, contains grammatical categories. Its terminal symbols are the morphemes of the language. The transformational component contains transformation rules. These will produce a series of new, derived phrase-markers. The terminal symbols are the formatives. Each transformation is a series of formal operations belonging to one of the four classes of processes: substitution, ellipse, adjunction, and permutation. The underlying phrase-markers are finite in number, but the derived structures are infinite. This means that the recursive or creative principles of natural languages are ascribed to the role of transformations, in particular to the generalized transformations. The function

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10 This term is borrowed from Bolinger (1948) (cf. Chomsky, 1964).
of the generalized transformations is to embed one phrase-marker in another.

The semantic component has an interpretative function. It contains one dictionary and two types of projection-rules. The function of these projection rules is to eliminate all the incompatible combinations of features. The first type eliminates the incompatibilities of the underlying phrase-markers, while the second treats the products of the generalized transformations. The phonological component has three groups of rules which are applied to the phrase-marker, which is the output of the syntactic component, to give it a phonetic realization. The essential modification in Katz and Postal's model is to discard the distinction between elementary transformations and generalized transformations. The transformations which affect the meaning of the sentence such as the passive, the negative, the imperative, the interrogative and embedded phrase-markers prove that the generative transformation of these elements causes needless complications. A simpler grammar would treat them as language universals - they would be equivalent to grammatical categories. This is a methodological decision which brings out certain implications:

1) The recursiveness of the language is no longer in the transformational rules; the embeddings of phrase-markers are realized by one or several syntactic rules of the following type:

\[
NP \rightarrow \left\{ \begin{array}{c}
N \\
# \ S \ #
\end{array} \right\}
\]

where # . . . . # are the boundaries of the embedded sentence.
The sequence of underlying phrase-markers is considered infinite.

2) The T-marker notion disappears; all transformations are considered singularly and made up of one or several operations of adjunction, ellipse, substitution or permutation.

Katz and Postal considered the first possibility but concluded in favor of the second.

With all these modifications Katz and Postal's model presents this definitive schema (ibid:161).

Description of Language L

The advantage of this model is that it allows for the clarification of the notion of language universals. Katz and Postal distinguish between "formal universals," or the universals which decide on the form of a grammar (i.e. transformation rules) and "substantive universals," or the universals which decide on the substance of a grammar (i.e. the phonetic or semantic features and the terminal categories of the syntactic rules: interrogation, negation, wh, syntactic categories). With the integrated theory, Katz and Postal suggest a reformulation of the transformational subcomponent of a grammar. This proposal aims to
incorporate into the framework of transformational grammar a semantic component which will provide a set of readings for the sentences generated by the syntactic component. They propose that the transformational sub-component should not involve any changes in meaning. In that case, the deep structure and all the meaning content comes from the phrase structure rules, and the transformations serve to convert the deep structure into the surface structure. In order that the transformational subcomponent not change meaning, however, two basic changes are necessary. First, optional transformations must not alter meaning of the deep structure. Second, generalized transformations must be eliminated completely. Since such formations as questions, imperatives, and passives were earlier obtained by the use of optional transformations and were meaning changing, these formulations must be revised.

If the elimination of generalized transformations is realized, another change must occur in the phrase structure rules. Since one reason for having generalized transformations was to provide for embeddings which led to relative clauses, the recursive device now has to be inserted in the phrase-structure to generate such structures. Then, the obligatory transformation rules can use the recursive S to provide the necessary changes to account for the embeddings. The resulting obligatory transformations are in fact not too different in form from the earlier generalized transformations. With these changes, the semantic component takes as its input the output of the phrase structure rules. In this way there is no need for the semantic component to be concerned with the transformations.
The semantic component proposed by Katz and Postal (1964) is an extension of that proposed by Katz and Fodor, in "The Structure of a Semantic Theory" (1963).

D. Aspects of the Theory of Syntax (1965)

The Aspects model presents some terminological innovations and solidifies the notion of the base; it defines more clearly the limits of performance and competence. Chomsky claims that his generative grammar is based on competence, and attempts to correct the deficiencies of the traditional grammar, considering the recursive principle as the creative aspect of language. The metatheory presented in Aspects makes an explicit formalization of the following notions:

1) the level of adequate grammars (ibid:§4:18-27; §6:30-37);
2) the universal theory (§5:27-30);
3) the evaluation of procedures (§7:37-47);
4) the behaviorist/rationalist acquisition models (§8:47-59);
5) the strong/weak generation power (§9:60-62).

This work also includes an innovation: surface/deep structures. These concepts are useful in the two levels which characterize the model, but in the opinion of some critics the two concepts do not

This terminology is borrowed from Hockett (1958) according to Chomsky (1964:84).
provide any theoretical changes. The concepts of deep and surface structures do not affect the function nor the position of the interpretative components of the general model. The two levels of structuralization are not connected to any hypothesis of psychological processes leading to the act of speech. Chomsky has insisted on the "neutral" status of his model in regard to the speaker and the listener. In postulating the surface and deep levels of structure Chomsky formulates a hypothesis relating to the structure. The function of this structure differs with the aspects of language that it has to account for. The Aspects model presents four distinctive notions:

1) Recursiveness - recursiveness is an exclusive property of the base rules and is distinct from the rules which are applicable to the deep structures;

2) Rule type - the deep structure rules do not have any transformations;

3) Semantics - the principle that transformations do not affect the meaning of the sentence confines semantics to the deep structure;

4) Lexicon - since semantics is confined to the base, the lexicon must be introduced in the deep structure.

In Aspects of the Theory of Syntax Chomsky has adopted and expanded the proposals of Katz and Fodor (1963), and Katz and Postal (1964). He further suggests the introduction of syntactic distinctive features, and proposes that the phrase structure component be replaced by a base component which has two types of rules, the branching and
the subcategorization rules. The branching rules are like the earlier PS rules. The subcategorization rules serve to rewrite a lexical or grammatical category as a set of features by means of the notion of a complex symbol (CS). When an element is rewritten as a CS it is assigned the set of contextual features which co-occur with that element under the dominance of the immediately preceding node.

With the Aspects model Chomsky attacks the complicated problems of cross-classification, but does not solve them. The formulation of this model provides a much shorter set of base rules than the earlier PS rules, since within the new system, the lexicon is a separate part of the base, rather than a set of low-level phrase structure rules. The lexicon is considered to be an unordered set of entries. Each entry contains phonological, syntactic, and semantic features.

1. The Notion of Grammaticality

The real goal of Aspects is the presentation of the modalities of grammaticality. Based on a fragment of a transformational grammar of English, Chomsky wants to generalize certain notions which would bring changes to the universal model. A grammar such as the one present in Syntactic Structures, or constructed after the Katz and Postal model, would generate correct sentences (1965:76): "Sincerity may frighten the boy," but would also generate incorrect sentences such as: "Sincerity admires the boy." Yet a grammar must avoid the generation of sentences of the second type.
Chomsky proposes two levels of grammaticality besides that of the categories already established by the base rules of syntactic structures. The first level of grammaticality is already well defined in the traditional grammars; Chomsky names it the level of "subcategories," i.e., the subclasses of nouns: animate, countable, abstract, etc., and the verbs: transitive and intransitive. The second level of grammaticality refers to some predicates, especially those verbs requiring an argument to belong to a given sub-category, such as the verb sing which needs an animate subject, and the verb invent which needs an inanimate complement. This restriction is called "selectional." Having defined these two levels of grammaticality, Chomsky proposes several ways to incorporate them in the grammar. He also examines the implications of the three proposed solutions, showing the advantages of each one. He thus opens up several ways to pursue research, but at the same time he has created considerable confusion among linguists. He presents the following fragment of grammar (Aspects:106-107):

2. An Illustrative Fragment of the Base Component

1) S → NPPredicate-Phrase
2) Predicate-Phrase → AuxVP (Place) (Time)
3) VP → \{ V \{ S' Predicate \} \}
4) Predicate → \{ Adjective (like) Predicate-Nominal \}
5) Prep-Phrase → Direction, Duration, Place, Frequency, etc.
6) \( V \rightarrow CS \) where \( CS \) = a Complex Symbol

7) \( NP \rightarrow (\text{Det}) \ N \ (S') \)

8) \( N \rightarrow CS \)

9) \([+ \text{Det } \_\_\_] \rightarrow [+ \text{Count}]\)

10) \([+ \text{Count}] \rightarrow [+ \text{Animate}]\)

11) \([+ \text{N}, + \_\_\_\_] \rightarrow [+ \text{Animate}]\)

12) \([+ \text{Animate}] \rightarrow [+ \text{Human}]\)

13) \([- \text{Count}] \rightarrow [+ \text{abstract}]\)

14) \(+ \text{V}] \rightarrow \text{CS/}\alpha\text{Aux } \_\_\_\_ (\text{Det})\beta, \text{where } \alpha \text{ is an } N \text{ and } \beta \text{ is an } N\)

15) \text{Adjective} \rightarrow \text{CS/}\alpha \_\_\_\_\_\_

16) \text{Aux} \rightarrow \text{Tense (M) (Aspect)}

17) \text{Det} \rightarrow (\text{Pre-Article of)Article (post-Article)}

18) \text{Article} \rightarrow [+ \text{Definite}]\)

The lexical entries are marked by a series of subcategory features, as follows (ibid:107):

- Sincerity \([+ \text{N}, + \text{Det}_\_\_\_, - \text{Count}, \text{Abstract}, ...]\)  
- Boy \([+ \text{N}, + \text{Det}_\_\_\_, + \text{Count}, + \text{Animate}, + \text{Human}, ...]\)  
- Frighten \([+ \text{V}, + \_\_\_\_NP, [+ \text{Abstract}] \text{Aux}_\_\_\_\_\_\_\_\_Det [+ \text{Animate}], + \text{Object-deletion}, ...]\)  
- May \([+ \ M, ...\]  

a) \text{Solution I (Aspects:84-106)}

This solution has the purpose of introducing subcategorization and selectional rules by means of rewriting the rules of the base. The
base-rules will generate a sequence of elements, among which there will be CS, composed of bundles of subcategory features. A lexical rule, illustrated below, allows the insertion of lexical entries only where the features of the entry agree with those of the generated Complex Symbol. If Q is a Complex Symbol of a preterminal string, and (D,C) an entry in the lexicon, where C is not different from Q, then C may replace Q.

b) Solution II (Aspects: 120-123)

This hypothesis places the subcategory rules in the lexicon. The base component will be composed only of rules of categorization, whose function will be to determine the primary grammatical relations and to attribute to these grammatical relations a linear order. Thus, component will be completed by a complex lexicon, where each entry will be of the form: (D,CS), where D is a matrix of phonological features and CS, a complex symbol, i.e., a sequence of semantic and syntactic features. The syntactic features will be of two kinds:

1) Subcategorical rules, simplified by redundancy rules;
2) Selectional rules, expressed in terms of subcategorical or categorical contexts.

A lexical entry such as boy will contain the feature [+ human], and implied by a redundancy rule - the following sequence of features: [+ animate], + [count], + N]. The lexical entry may by means of lexical rule replace a preterminal symbol |+ N|. In this way, the entry frighten will contain the features |[+ abstract] Aux___Det [+ animate]|, implying |+ N| [+ animate]. This verb can only appear in the context
\[+ \text{N Det} + \text{N}\], where \(\text{N}'s\) contains the features \([-\text{abstract}]\) and \([+\text{animate}]\) respectively.

c) **Solution III (Aspects: 156-160)**

In examining the following sentences:

1. "It is nonsense to speak of (there is no such activity as) frightening sincerity,"
2. "Sincerity is not the sort of thing that can be frightened,"
3. "One can(not) frighten sincerity,"

Chomsky proposes to incorporate the selectional rules (which contain features of subcategorization) into the semantic component. It is evident that the presence of semantic elements such as "it is nonsense" allows one to accept as grammatical some sentences which would be rejected by solutions I and II. According to Chomsky, it is therefore possible to allow for the generation of these strings directly in the syntactic component, which is not very convincing. I believe that it would be possible to keep these sentences, though they would have to be marked as incorrect at the semantic level. This is a strange argument because the retention of every grammatical sentence, even on the level of the rules of subcategorization, adds an unnecessary awkwardness to the grammar. It seems evident that the hypothesis of subcategorization presents a fluctuation on the demarcation of the limits between semantics/syntax. This imprecision of limits is a serious weakness of the theory. Chomsky leaves this solution without treating it any further.
3. The Relation Between Components

Chomsky seems to accept the conclusions of Katz and Postal (1964) that transformations do not change the meaning of sentences. Combining this hypothesis with the one underlying the organization of the base in solution II, Chomsky proposes the following model, which is reproduced here in a graphic form (Aspects:141-142):

The categorical subcomponent of the base consists of a sequence of context-free rewriting rules. The function of these rules is, in essence, to define a certain system of grammatical relations that determine semantic interpretation, and to specify an abstract underlying order of elements that makes possible the functioning of the transformational rules. . . . The infinite generative capacity of the grammar arises from a particular formal property of these categorical rules, namely that they may introduce the initial symbol S into a line of a derivation. In this way the rewriting rules can, in effect, insert base Phrase-markers into other Phrase-markers, . . . The lexicon consists of an unordered set of lexical entries and certain redundancy rules. Each lexical entry is a set of features. . . . Some of these are phonological features, drawn from a particular universal set of phonological features (the distinctive-feature system). . . . Some of the features are semantic features. These, too, are presumably drawn from a universal "alphabet." . . . We call a feature "semantic" if it is not mentioned in any syntactic rule, thus begging the question of whether semantics is involved in syntax. The redundancy rules of the lexicon add and specify features wherever this can be predicted by general rule.
The semantic interpretative component may be constructed and consists of Projection-rules of type I (Katz and Postal, 1964). These projection-rules give to the deep structure a semantic interpretation on the basis of the interpretations given to the constituent elements. The transformational component consists of a series of singulary transformations, where each one is defined in terms of a structural description and a sequence of elementary transformations. The phonological component is also purely interpretative. It consists of a series of rules which are applied cyclically to the surface structure, beginning with the terminal elements of the tree representation.

a) "Grammatical Transformations"

In the third chapter of *Aspects*, Chomsky presents some suggestions on the theory of transformation. His hypotheses of transformations are independent of the choice of any solution for the base form. Chomsky proposes to delete from the elementary transformations the class of operations called "permutations." He demonstrates that any permutation must be formulated in terms of adjunction, ellipse, or substitution. A second proposition determines the conditions of the ellipse which seems to be reproduced in the absence of differences between features rather than in the case of absolute identity. The most important innovation concerning transformations is the function of filtering processes

12 This type of modification emerges from the research on the use of the computer to verify the validity of the syntactic rules. This research has sought to establish a more realistic and stable notation than the one used in the first works on transformational theory (Zwicky, 1965).
(though Chomsky states that this notion had always been implicit in his theory, Aspects:139). Any deep structure cannot be realized directly in surface structure, but must undergo transformations. If a phrase-marker does not correspond to the structural description of any transformation, then there cannot be any derivation, and the system is therefore "blocked." This means that the products of the grammar are of two kinds:

1) A series of well-formed surface structures enumerated as grammatical sentences of the language, and derived by simple transformations (Syntactic Structures:57);

2) A series of sterile deep structures, which do not meet the structural description of any transformation.

The presence of this second series is superfluous and a serious problem in the Aspects model.

b) The Lexicon

In "The Structure of the Lexicon" (§2, Section 4:164-192), Chomsky points out certain implications if we adopt solution I. This solution does not affect the general form of the model described in the preceding section even though the author does not mention it, but it allows the use of some rules in the lexicon which reduce the number of features represented for each lexical entry. These rules would have, therefore, the same function as the rules of morphophonological structure presented by Halle (1959) for the phonological component. Chomsky, in his system, calls them "phonological redundancy rules." In the above section, Chomsky outlines the existence of parallel
rules, called "syntactic redundancy rules." They would allow one to distinguish between "possible lexical forms but non-existent" and "impossible lexical forms." They would also have the general purpose of reducing to a minimum the necessary descriptive features of a lexical entry. Chomsky does not explain, however, how these rules could be incorporated into a model which adopts solution II, with a more complex lexicon.

In this chapter I have presented the beginnings of the new generative-transformational linguistic school and an examination of the fundamental principles and concepts of this school. The development of the transformation theory which is crystalized in Chomsky's *Aspect of the Theory of Syntax* was analysed in order to serve as an introduction to my formulation, in Chapter 4, of a descriptive grammatical model.
CHAPTER 2

"POST-ASPECTS" DEVELOPMENTS

INTRODUCTION

This chapter, which focuses on the concretization of certain particularly important notions developed after Chomsky's Aspects, is organized in two main parts: 1) the post-Aspects developments, and 2) changes in transformational theory. The discussion will be impartial and explicit even though some of the theoretical notions seem contradictory. Criticisms and personal interpretations of these developments will be revealed in Chapters 4 and 5 in connection with my own grammar of Portuguese. This section, however, does not discuss any individual grammars.

I. RECENT INNOVATIONS IN LINGUISTIC THEORY

A. Principal Developments

The most remarkable characteristic of the post-Aspects period of linguistic study is that the Chomskyan school is no longer dominated by its originator's thinking. During the fifteen years after his first conception of the theory, Chomsky has prepared a whole generation of linguists and has influenced a fair number of his contemporaries. Since then, he seems to have become interested in other aspects of linguistics. The diversification of his interests is reflected in his publications.
It is understandable, therefore, that the development of his theory has brought the new linguists to the diverse results. It should be noted also that generative-transformational grammar theory is still a North American development. Although Saumjam has given an important place to the theory in Russia, it has had only a slow and limited expansion elsewhere outside this continent; for example, in England, Holland, East Germany, Romania and Japan. Except for these countries, Chomsky's theory has impressed philosophers and psychologists more than linguists.

The following discussion explores some important notions in Chomsky's theory.

1. The Transformational Cycle

The notion of cycle, developed in phonology and used successfully for the first time in an article by Chomsky, Halle and Lakoff (1956), illustrates the complex system of rules for stress and vowel reduction. The principle of the transformational cycle consists of ordering the rules and giving them a recursive mechanism by which they reapply again and again in a cyclic way, first to the minimal constituents of a structure, next to the upper elements of a given structure, and finally to the highest domain of processes affected by the rules. Chomsky suggested (1965) that the transformational rules of the syntactic component be organized in a cycle by analogy to the rules of the phonological component. The post-Aspects research centres on the
ordering of cyclic transformations. Lakoff and Ross (1966) demonstrate
the necessity of ordering some rules in relation to others in a cycle, and Lakoff (1966a) suggests the existence of:

a) Pre-cyclic transformations; some transformations which
must precede the application of other rules.
These can be applied independently.

b) Cyclic transformations; these transformations can only
be applied in order.

c) Post-cycle transformations; these transformations
are applied independently.

The importance of the sequence in which the transformations
are applied is demonstrated by Fillmore (1962-1965) in the solution
of the problem of prepositional variants associated with the indirect-complement English constructions which show different syntactic prop­erties. Here are two structures:

1) John bought a book for me,
2) John gave a book to me.
These have a common variant:

3) John \{ bought \} me a book.
\{ gave \}

The first and second sentences have a similar surface structure, but only
(2) may become a passive sentence:

* 4) A book was bought me,
5) A book was given me.¹

¹This sentence is partly grammatical.
Fillmore suggests the existence of two different transformations to generate the two forms of (3) from (1) and (2), using the first transformation after the passive transformation, and the second before. Then the model will generate sentences (1), (2), (3), (5), but not (4). For English, several sequences of transformations have been proposed (Rosenbaum and Lochak, 1968; Lakoff and Ross, UESP, 1969); for French (Langacker, 1966, and Querido, 1969).

2. The Notion of Constraint

The notion of constraint in generative transformational grammar comes from the interpretation of one of Chomsky's theories, explained by Postal during a course in syntax at MIT (1964-65). In his interpretation the filtering of the exceptions to the rules is considered a useless complication in the grammar. Ungrammatical sentences will be generated by the grammar due to certain inefficiencies of the model. This grammar must have a mechanism to characterize the irregularities generated by the syntactic rules. The construction of such a mechanism is discussed in Lakoff's dissertation, *On the Nature of Syntactic Irregularity* (1965). The ingenious system of "metarules" proposed by Lakoff has as its main aim to point out some regular characteristics of the system of transformational rules. These regularities seem to go beyond the type of generation contained in a transformation rule. There are, however, two points of view on this aspect of linguistic theory.

First, Chomsky in his paper at the 9th International Congress (1962-1964:930), proposes the "A over A" principle. This principle
consists in a phrase X of category A embedded within a larger phrase ZXW which is also of category A, then no rules applying to the category A applies to X but only to ZXW. The second point of view, stated by Postal, claims that transformations should not include individual lexical elements. This generalization is expanded by Ross (1967) in his doctoral thesis, which is a treatment of constraints in the usage of variables in transformational rules. Ross restricts his study to "movement transformations." These transformations in surface structure make a syntactic element take the place in the linear sequence which would not have the same place in deep structure. Ross's conclusions are interesting for a theory of universals. He classifies three types of constraints, A, B, C, according to the variables used in the transformational rules.

A) Universal Constraints, which belong to the structure of any natural language. There are two types of universal constraints:

1) Constraints on the complex noun-phrase,
2) Constraints on the coordinate structures.

Ross concludes that in the movement rules of the constituents, the variables must be constrained. These constraints are characteristic of several transformations and are important generalizations of the language, and, perhaps, of all natural languages.

B) Obligatory Constraints - These constraints have an application in some languages or language groups. The constraints need obligatory conditions for application to languages. Unlike the universal constraints which are real generalizations, these constraints are more specific, and may lead to false analysis in the base-rules.
C) Deep Constraints - This type of constraint is taken up by Perlmutter (1968), and Lakoff (1968), with an application to Spanish by Rivero (1970). Perlmutter expands this type of constraint which will be discussed in detail in the following chapter.

B. Generative Semantics

Generative semantics is an outgrowth of transformational grammar and plays a central role in syntax. The generative semantics position is, in essence, that syntax and semantics cannot be separated from each other and that the role of transformations and derivational constraints in general is to relate semantic representations and surface structures. The term "generative" should be taken to mean "complete and precise" (Lakoff, 1969:77).

1. Weinreich's Theory

The integration of the semantic theory of Katz and Fodor into a generative theory of linguistic description that follows up Chomsky's syntactic theory constitutes the first semantic component, but is not the first semantic theory to be formalized in the conception of the generative-transformational school. Already in 1961, at the Congress on Language Universals, Weinreich (1961-1963) proposed a theory of semantics that combines Chomsky's notion of grammaticality with a logical
system of analysis proposed by Reichenbach (1948). The main points of Weinreich's theory are as follows:

1) The autonomy of syntax vs. semantics,
2) A lexical semantics and "combinatory semantics,"
3) The description of the lexical element by distinctive features,
4) The logical nature of the semantic combination.

Weinreich formulates a class of universals (1963:167) with respect to combinative semantics and its relations with syntax.

In all languages a combination of signs takes the form of either linking or nesting, and all languages use both patterns in kernel sentences. No further patterns are introduced by transformations. While the number of levels is not theoretically limited, linking on more than three and nesting on more than four is very rare.

The misinterpretation of some points in Weinreich's theory and the clash with Katz and Fodor's theory in two irreconcilable points of view have created many polemics. These are based on Weinreich's (1966:402-405), rejection of a distinction between semantic and syntactic features. He bases this decision on the following argument: "... a subcategorization step is taken if failure to do so makes the grammar generate (a) ill-formed expressions or (b) ambiguous sentences - the reasons of subcategorization in syntax turn out to be precisely the same for semantics" (1966:403). Weinreich's argument questions the notion of grammaticality in the implicit sense of the solutions I and II presented in Aspects. He shares Quine's point of view (1953) which is explicitly rejected by Chomsky, that the grammarian should only be concerned with the two notions
of interpretability and synonymy. Weinreich chooses the criterion of simplicity in the symmetry of semantic and syntactic features ("they correspond in form and motivation") and proposes a model for linguistic description which differs from the Aspects' model in the following points:

1) Lexical representation by two sets of features; one set of semantic-syntactic features and one matrix of phonological features;

2) The base structure may be explicitly formalized using a technique similar to Reichenbach's predicate logic;

3) The need to interrelate semantic rules with syntactic rules at the level of deep structure, and the need to recognize certain semantic features before the lexical insertion;

4) A Semantic Component has two constituents:
   a) A "calculator," which is a more complex version of the Katz and Fodor projection rules,
   b) An "evaluator," which gives a qualitative value to the meaning of the sentence (this system is close to Lakoff's metarules system, 1965).

Weinreich's position is based on a semantic criterion as opposed to Katz and Fodor's position which is based on a phonological criterion. His concept of "lexical item" is one for each semantic reading, or a one-to-one correspondence. The word bachelor would have four lexical items "bachelor," for the four different semantic readings. Weinreich's disambiguation theory applies to the examination of the semantic
representation of the whole deep structure. This theory requires the factual knowledge, i.e. the knowledge of the outside world, of the language users. Weinreich's formulation of a semantic theory is an important step towards Generative Semantics.

2. Gruber's Theory

Gruber's work is based on the concept of utterance synonymy. He wants to account for our intuition which relates such sentences as:

1) John sold the car to Peter,
2) Peter bought the car from John.

Gruber proposes a deep structure which gives a similar representation to these sentences. Different rules will then account for the different lexical and syntactic interpretation. It is a system close to a so-called generative semantic theory, as opposed to an interpretative theory. Unlike Weinreich, Gruber does not want to modify the semantic component of Katz and Fodor, but to state that the semantic component is responsible for only one part of the semantics of the sentence. The other part is not a dictionary with its lexical entries and semantic features, but a system of rules generating semantic structures at a level deeper than Chomsky's deep structure. These structures from a semantic base are then interpreted by Projection rules of the Katz and Fodor type, and by those transformation rules which give to the lexical elements of the sentence a realization corresponding to the lexical entries of a dictionary. The semantic structure receives a phonological form and reaches the level of deep structure proposed by Chomsky. From this level
on, Gruber's model is identical to *Aspects* and is completed by means of a transformational and morphological component as described by Chomsky. Gruber's base rules are of a context-free, rewriting type.

Gruber's theory differs from Chomsky's theories in the following three points, the fourth is common to both.

1) The concept of grammaticality occurs at the level of an adequate utterance interpretability;

2) A syntactic structure is not the central part in the model: the syntagmatic syntactic rules are eliminated and all the syntax is interpretative in relation to the deep semantic structure of the sentence;

3) The lexical level is not meaningful in the semantic structure, but only as syntactic and phonological interpretative levels;

4) The type of syntactic and transformational rules used in a Chomskyan grammar may account for the semantic structure of the sentence.

3. **McCawley's Theory**

In a series of articles published since 1967, McCawley has been exploring some of the hypotheses postulated by Weinreich and Gruber. In one of his first articles, "The Role of Semantics in a Grammar" (1968), he adopts for his theory the type of lexicon such as the lexical item approach, proposed by Weinreich, one lexical entry for each different semantic interpretation opposed to the type of polysemic dictionary
entries of Katz and Fodor, who use the dictionary approach, one lexical entry with multi-semantic readings. McCawley, however, attempts to formalize the rules to derive some lexical items from others (as in Gruber's concept). He adds to Weinreich's dictionary a series of derivational rules which generate some lexical items from others. Therefore, the word "warm" in sentence 2 can be derived from "warm" in one:

1) The coffee is warm,
2) The coat is warm.

McCawley claims that the lexical item warm has its implicational relationships, where the presence of one lexical item is predictable from another. He also favours Lakoff's concept of the "reification process" (1968) and Wierzbicka's formula (1967), where John in sentence one may be the source for John in sentence two:

1) John thinks that the world is flat,
2) John weighs two hundred pounds.

In a postscript of this article, McCawley adds to this conception of lexicon the results of Gruber's work. Then he questions the value of deep structure and rejects the notion of deep structure in the sense of the Aspects model. He claims that Chomsky's syntactic features do not have any function in the selection of lexical items, and proposes an equivalence between Chomsky's deep structure and the semantic structure of the sentence. McCawley's model becomes, then, a combination of Weinreich's and Gruber's proposals. Its base structure is similar to Gruber's and its transformational component is predicted by Weinreich's conception. The transformational component is an amalgamation of syntactic and semantic
rules, with derivational generative semantic rules, of McCawley's own type. The transformations are characterized by semantic-syntactic features (Weinreich's type), and rules for introduction and incorporation of lexical elements (Gruber's type). The transformational component has all the functions of a semantic component of Weinreich's type "calculator-evaluator" and Gruber's interpretative or Katz and Fodor's type. McCawley considers all semantics to be of a generative nature.

In another series of articles (1967:55) McCawley defends his claim that syntax as an autonomous mechanism does not exist. He wants to demonstrate that symbolic logic, with slight modification, is an adequate system for the description of the semantic structure of natural languages and he does show that some transformations are dependent on an analogous representation of their correct formalization and that the same mechanism may account for both syntactic and semantic operations. At the same time the traditional argument for the dichotomy differentiating syntax and semantics is rejected on the following basis:

1) Semantics possesses, like syntax, a syntagmatic structure;
2) There is not a clear division between transformations of semantic and lexical features;
3) The categories recognized in syntax do not play any function in the semantic representation. Therefore, these categories are useless;
4) Indices of reference are treated in a grammar of semantics better than in a grammar of syntax;
5) Selectional restrictions are definable solely in terms of properties of semantic representation. Therefore, their position is in the semantic component.
McCawley considers that the most refined selectional restriction process must be met in the semantic component and be accounted for by the speaker's total factual knowledge of the world. He gives to semantics all the characteristics of syntax.

4. Lakoff's Theory

Lakoff's doctoral thesis (1965) gives a syntactic explanation of the two verbs **harden**, which are equivalent on the semantic level:

1) The metal hardened,
2) John hardened the metal.

Lakoff's analysis of the second sentence is:

```
S
   NP  VP
      V   NP
         John causative NP S NP VP metal harden
```

This analysis is similar to Gruber's and points out a deep structure at a deeper level than *Aspects*. Gruber calls this structure "pre-lexical," where the causative element must undergo an "incorporation process" before it can produce the correct surface structure - "John
hardened the metal." Lakoff demonstrates that this process is part of the transformational cycle. In his article "Instrumental Adverbs and the Concept of Deep Structure" (1968), Lakoff renounces the concept of deep structure. He demonstrates that the theory lacks generalization when giving a different deep structure to two synonymous sentences, such as:

1) John cuts the sausage with a knife,
2) John uses a knife to cut the sausage.

He postulates a series of tests to show that the two structures are identical and he proposes to connect them with one transformation. Lakoff's "reification process" demonstrates that not every item of the language (Weinreich's concept) has to appear in the lexicon of the language; all languages have "implicational relationships" among their lexical items, in which the existence of one implies the existence of another. He cites, for example, words representing the temperature range, and temperature sensation, as in the sentences:

1) The coffee is warm,
2) The coat is warm,

where there is only one phonological shape for the lexical item warm. The lexical item warm in sentence (2) would be derived from the lexical item warm in sentence (1). Weinreich and McCawley call this process of the lexical item warm, the "implicational relationship" and Lakoff calls it the "reification process," where the presence of a lexical item is predicted or derived from another.

---

Sentence 2 may be ambiguous: "warm 1" meaning "thick and heavy" and "warm 2" meaning "temperature warm" (warm from a radiator). In this case there would be 3 lexical items "warm," where "warm 1" and "warm 2" in sentence 2 would be derived from lexical item "warm" in sentence 1.
Lakoff defines meaning as being the most important part of the grammar. His basic theory is "generative semantics," which claims that semantics can be handled as syntax. Generative semantics refutes autonomous and arbitrary syntax. He considers autonomous syntax as using ad hoc methods for analysis, and he also rejects the Katz and Fodor theory. Autonomous syntax assumes that grammatical regularities are completely characterized without recourse to meaning.

Lakoff, in his article "On Generative Semantics," rejects the concepts of intermediate levels of structure and deep structure. He posits two kinds of transformations:

1) Local derivational constraints, which are similar to Chomsky's transformation type and have the function of relating sentences;

2) Global derivational constraints, which are also similar to transformations but are formalized ordered rules and can only apply in certain circumstances. These global derivational constraints may be of two kinds:
   a) Obligatory, when in developing a sequence one wants to reach another sequence and has to adopt the transformation to reach the end,
   b) Optional, one or more transformations of semantic content which allow the desired sentence to be achieved.

Lakoff recognizes a "shallow structure," which is a label for a particular P-marker. It is an in-between level of structure, a syntactic state which applies in between
some global constraints. Lakoff's argument is that if we can show that some transformations must apply before the insertion of lexical items, then lexical insertion does not apply at a single level, and thus deep structure does not exist.

Summarizing the generative semantic school whose leaders are McCawley and Lakoff, we point out the main aspects of the theory:

1) Complete rejection of the level of "deep structure," justified on these grounds:
   a) Co-occurrence, which is purely a semantic problem;
   b) Lexical entries may appear at any level of the derivation but not all at once;
   c) The grammatical relations show up only on the surface level.
2) The equivalence of function of transformations and semantic interpretative rules.
3) The equivalence between the semantics and the logical forms of the sentence, where the possibility of representing semantic structure in terms of a system of logic is postulated. McCawley (1968b) has suggested a modified form of Predicate Calculus to represent semantic structures. Lakoff (1970) in a more recent article proposes a new form of logic, which is a development from Modal Logic, incorporating notions of "presupposition," "topic" and "focus," as well as the traditional predicate analysis.
4) The presence of "global constraints" on the derivation, which, according to Lakoff, is the great contribution of Propositional Logic to Linguistics, in the above concepts.

C. The Lexicalist Hypothesis

In an article (1967) Chomsky proposes a new way to treat 'nominalization,' which he calls "the lexicalist hypothesis," based on the origin of derived nominalizations. In the lexicon model present in Aspects the use of contextual features allows for the insertion of only one entry for the verb or noun slot, in accordance with certain morphophonemic rules. Chomsky (1967:12) proposes the following base rules:

\[
\begin{align*}
\text{NP} & \rightarrow \text{N COMP} \\
\text{VP} & \rightarrow \text{V COMP} \\
\text{AP} & \rightarrow \text{A COMP} \\
\text{COMP} & \rightarrow \text{NP, P, NP P, NP PP, PP PP, etc.} \\
\text{P} & \rightarrow \text{Preposition} \\
\text{PP} & \rightarrow \text{Prepositional Phrase}
\end{align*}
\]

Noting the similarity of the first three rules and the awkwardness of the Complement category, Chomsky (1967:27) proposes a new notation called "The X-Bar Convention." This notation allows one to show the parallelism of derivation of the different types of phrases. The symbol $X$ designates a node dominated by the element $X$, such that the base rules introduce $N$, $A$, and $V$ (as above), which are replaced by the rule $X \rightarrow X$...

Following the same notation, the nodes dominated by $\text{N}$, $\text{A}$ and $\text{V}$ are
designated as \( \overline{N} \), \( \overline{A} \), and \( \overline{V} \) respectively; the phrases associated with \( \overline{N} \), \( \overline{A} \), and \( \overline{V} \) in the base are the "specifiers." The introduction of the elements in the base can be done by the following schema:

\[
\overline{X} \rightarrow \text{specify } \overline{X} \overline{X}
\]

where specified \( \overline{N} \) - Determinant

" \( \overline{V} \) - Auxiliary

" \( \overline{A} \) - Adjectival AP

The definitive base rules proposed by the lexicalist hypothesis are as follows:

\[
P \rightarrow \overline{N} \overline{V}
\]

\[
\overline{X} \rightarrow \text{Specify } \overline{X} \overline{X}
\]

\[
\overline{X} \rightarrow X \ldots
\]

By means of this convention Chomsky wants to account for syntactic generalizations concerning the structure of the complements \( N \), \( A \) and \( V \) which belong to the same derivational family, and try to account at the same time for the lexical derivational irregularities. Although we agree with this new analysis in its principle, we think this solution is not entirely acceptable. In the base rules formulated, it shows neither representation of syntactic functions, nor any structuration which distinguishes between a NSubject and a NComplement. Chomsky recognizes in Aspects the need of these functions in the formulation of the syntactic rules.

The lexicalist hypothesis has been adopted in the UCLA English Syntax Project (UESP, 1968:69). The researchers of this investigation have integrated the theory of the lexicalist hypothesis with Fillmore's theory of Case Grammar in order to remove the deficiencies of the new Chomskyan analysis.
D. **Interpretative Semantics**

Interpretative semantics is one school of semantics which follows up the Aspects model. It postulates a "deep structure" generated by a system of rules independent of context at which level the lexical features are introduced en bloc. Chomsky (1968a, 1970) says that since in a model "neutral" by definition, in terms of performance, the notions of a position of a component - before or after - in relation to another component, are arbitrary, the semantic component may come before or after the syntactic component in the organization of the model. He concludes that the two positions are equivalent (1968:5).

Katz, in his recent work (1970), has adopted the same attitude as Chomsky towards generative semantics, and has elaborated more extensively on some of the objections.

There are three positions on interpretative semantics. These positions are Chomsky's new proposal of the basic theory and Katz's and Fillmore's modification of that proposal.

1. **Chomsky's Position**

Katz and Postal (1964) and Chomsky (1965) agree on the neutrality of transformational rules in relation to the semantics of the sentence. The Katz and Postal theoretical principle places the semantics of the sentence in the base. But Chomsky (1968a) presents a number of arguments against this principle, showing that in several different bases the transformations add to the meaning of the sentence. To assure a correct semantic
form and to eliminate impossible interpretations, Chomsky supplies examples based on 'focus' and 'presuppositions' phenomena. Jackendoff (1969) gives examples of quantifiers and negation cases. Kuroda (1969) points out conditions constraining the occurrence of some forms such as "even," and "only."

In the following sentences
1) Did John give the book to Bill?
2) Did John give Bill the book?
we do not take into consideration the appropriate intonation pattern which would give the right answer to these two questions. Chomsky states that there is one pattern of normal intonation to each one of these sentences, but that in the order of the constituents, only the syntactic form determines an adequate answer. The final position of the interrogative form determines the "Focus" and the other elements, the presupposition of the sentence. Thus the first question presupposes that "John gave the book to someone," and it does not allow for an answer of the kind:

3) No, he gave George the photograph, because the answer would contradict the presupposition. In an analogous way, question (2) carries the presupposition that "John gave something to Bill," and excludes answers such as:

4) He gave the book to Mary.
Chomsky's conclusion is that interpretative semantic rules must follow the transformational and phonological components, because the sequence and the intonation patterns may contribute to the meaning of the utterance.
Chomsky (1968:35) proposes the following model of interpretative semantics:

1) The base has analogous rules to those formulated in the lexicalist hypothesis;
2) The transformation component is of the type postulated in Aspects (Ch. III);
3) The phonological component covers a system of rules as found in Chomsky and Halle (1968);
4) The semantic component is interpretative, as proposed by Katz and Postal (1964).

2. Katz's Position

Katz, in his opposition to Chomsky's interpretative semantics, and also as an attempt to defend his own model (Katz and Postal, 1964), confines semantics to the level of deep structure. He proposes that all the facts, "focus," "presupposition," "negation," and "quantifier cases" that Chomsky wanted to explain by interpretative rules, should be explained not at the semantic level but at the stylistic level. The following sentences which carry the accent in the underlined word, reveal the surprise of the speaker:

1) John is reading the newspaper,
2) John is reading the newspaper,
3) John is reading the newspaper.

These three sentences have the same syntactic content but the different emphasis is a stylistic fact. All Chomsky's surface interpretative rules
are called by Katz "stylistic facts." To account for them he postulates a stylistic component, which applies to the derivation after the application of the phonological component.

3. Fillmore's Position

The third point of view on Interpretative Semantics is presented by Fillmore (1969) who is inspired by "ordinary language philosophers" such as Austin (1962a, 1962b-1963), Strawson (1960-1963), Alston (1964) and Ryle (1953-1964). He believes that their methods are not directly applicable to linguistics, but their explanations could account for the co-occurrence of elements in sentences. Austin's attempt to define "felicity conditions" (usage conditions) may contribute to a semantic description of meaning, on larger units than the word. Thus, the utterance "close the door" needs the following conditions to be uttered:

1) A relation between the speaker and the listener;
2) The listener must be in a position to perform the command;
3) The door must exist, and be identified as the same door by both the speaker and the listener;
4) This door should be open at the moment of utterance;
5) The speaker must have the desire to see the door closed.

According to Fillmore, the philosophers have neglected the relations between the 'usage conditions' and the grammatical facts which characterize the sentence. As an example, the imperative implies condition (1), and the definite article implies condition (3). He points out that these conditions are of two types:
a) Preconditions or presuppositions. These are not affected by grammatical transformations.

b) Illocutionary (extralinguistic). These are exclusively affected by the transformations (negation only affects the fourth condition).

Fillmore postulates the hypothesis of "semantic paths," which says that from an exhaustive grammatical description, it would be possible to calculate the presuppositions that are implicit. This would be the function of the interpretative semantic component. But in order to account for the implicit presuppositions these first would have to be included in the description of each lexical element. In his article "Verbs of Judging: An Exercise in Semantic Description" (1969), Fillmore gives an illustration of this type of description, giving a description of a "semantic path" of the verbs associated with the act of judging or the "process of judging." As an example we reproduce here the two verbs accuse and criticize with their lexical descriptions. In the description of these two verbs we notice five lexical differences between them:

1) **Accuse** - is a performative verb (in Austin's (1962) sense), a verb which has an informative value and may also constitute an act of accusation. **Criticize** does not constitute an act.
   a) I **accuse** you of beating your wife,
   b) I **criticize** you for beating your wife.

2) **Accuse** - requires the proposition of before a third argument; **criticize** requires in the same environment the preposition **for**.
3) **Accuse** - presupposes that the situation is "bad"; **criticize** announces that the situation is "bad."

4) **Accuse** - says that the 'accusee' is responsible for the situation; **criticize** presupposes the situation.

5) **Criticize** - presupposes that the situation is a granted fact, while **accuse** does not indicate it at all.

For Fillmore all this information is necessary as part of the semantic structure inherent in the meaning of the sentence. The information must be included in the interpretative rules which will determine if a sentence is well-formed or ill-formed. He does not, however, describe the form of these interpretative rules, so we can only suppose that they would take the form of the Katz and Fodor type of projection rules, or the selectional rules of Chomsky.

E. **Case Grammar Theory**

Fillmore's work on "Indirect Complement Constructions" (1962-1965) diverges from Chomsky's Aspects model. The problem of the prepositional form of the indirect complement is part of the general problem of **prepositions** (1966a). Note the following examples (1966b-1968):

1) The key opened the door,

2) The man opened the door.

After having applied a passive transformation, these two sentences show different surface structure forms:

3) The door was opened **with** a key,

4) The door was opened **by** the man.
Fillmore proposes the concept of "deep cases" (1966a). This hypothesis would be applicable to languages like Russian, German, Latin, which present surface cases, and also for languages with a superficial realization of case such as English, French, Portuguese, with a prepositional structure, and even for Turkish with an agglutination ordering. Fillmore notes that this hypothesis accounts for a greater number of facts than the Aspects type of grammar. In a series of articles (1966a, 1966b-1968, 1967, 1968a, 1968b, 1968c-1969, 1970), he explains and justifies the properties of his model. This model (1968a:21-22) examines first the relations between some semantically similar, but phonologically different forms, such as the verbs "rob" and "steal." The difference between these two verbs may be represented as a function of the number and the permutation of cases:

1) George stole; George stole a fortune.
2) George stole from the bank.
3) George stole a fortune from the bank.
1a) George robbed the bank.
2a) George robbed the bank of a fortune.

These verbs have the following cases:

Steal \[Agent, (Object), (Patient)\]
Rob \[Agent, Patient, (Object)\]

By the same criteria we can explain the differences between the semantic variations of the same phonological form (1967, 1968).

1. \textbf{Break} - \[Object\]
   The window broke
2. **Break** - [Instrument, Object]
   The ball broke the window
3. **Break** - [Agent, Object]
   The man broke the window
4. **Break** - [Agent, Instrument, Object]
   The man broke the window with the ball

The verb **Break** requires only one entry in the lexicon:

**Break** [(Agent), (Instrument), Object].

The "deep cases hypothesis" accounts also for the notion of grammatical relations which, according to Fillmore, are an exclusively surface phenomenon. In the following sentences:

1) The boy slapped the girl,
2) The boy received a blow,

the notion of "subject of" comes from two deep structures. The difference is demonstrated by the cases that take the arguments of the verbs:

**Slap** [Agent, Patient]

**Receive** [Patient, Object]

The surface structure is given by the transformations and does not express any semantic relation. The same criterion can apply to the notion "object of." In the following sentences (1970:38), the word 'pumpkin' plays a different role in each deep case, but its position at the surface level is always that of an object.

---

3Where [ ] requires an obligatory presence of the argument.
   ( ) requires only an optional argument.
1) I smashed the pumpkin.
2) I grew the pumpkin.
3) I like the pumpkin.
4) I imagined the pumpkin.

**Smash** - [Agent, Object]

**Grow** - [Agent, Patient]

**Like** - [Patient, Instrument]

**Imagine** - [Patient, Object]

Fillmore's model has many advantages. Besides the ones already pointed out, it allows for the elimination in the grammar of noun-phrases and prepositional and adverbial phrases categories. Every argument of the verb takes the form of a unique nominal category, dominated by a deep case; this category may be realized at the surface level by a preposition or a noun-phrase subject or object (1966b, 1968:362).

A comparison with Chomsky's model shows that the deep case theory provides a simpler explanation for selectional features problems and lexical entries.

The following remarks summarize the most important aspects of case grammar. Case grammar theory proposes that all the sentences of a given natural language may be derived from the application of transformational rules to a proposition or to a series of co-ordinated or embedded propositions. The rules which determine the form of the initial proposition structures are of the type:

1) \( \Sigma \rightarrow (M) P \)
2) \( P \rightarrow V (O) (D) (A) (I) (...) \)
3) O D A I ... $\rightarrow$ K NP

Where $\Sigma$ = Sentence

M = Modality (time, aspect, adverb, etc...)

P = Proposition

V = Verb

D = Dative

A = Agent

O = Object

I = Instrument

(...)= Any other possible cases not explicitly formulated by the theory at the present

K = A constant: case, preposition, or word order, depending on the language.

A sentence consists of a proposition formed with a verb and its case frame. The case frame has the inherent properties of the lexicon of that verb. Fillmore defines "case frame" as a finite number of obligatory or optional roles, which are determined by the terms of the ensemble: Object, Dative, etc. The lexicon consists of the exhaustive list of the verbs defined by their "case frames," and perhaps also of other inherent syntactic properties. (Fillmore is not explicit about this.) We suppose that nouns and other categories are marked as inherent in the case categories to which they belong. The transformations realize the same type of operation as any other transformation system, such as ellipse, adjunction and substitution of elements. The function of the transformation is the object of an important modification. The grammatical functions of the sentence are created by a transformation. A transformation, then, has
the function of creating the grammatical category of subject and complement.

Fillmore's case grammar model has presented different versions, outlined in his articles. Its general form has been adapted for the description of several natural languages, such as English (UESP, 1968-1969), Spanish (Goldin, 1968), Latin (Binkert, 1970), and Russian (Channon, 1971).

F. Montague's Theory of Grammar

Montague's approach is different from any version of transformational grammar. This theory presents some reminiscences of the early Katz-Fodor theory where both PS-rules and transformations had corresponding projection rules. Montague's approach to syntax is to have rules like PS-rules and rules like transformations which may apply in mixed and variable orders. The order of operations is often of crucial semantic significance. There is also a notion of noun-phrases substituting for variables. Montague's grammar would analyse the following ambiguous sentence:

1) John is looking for a little girl with red hair,

with one derivation in which the noun-phrase "a little girl with red hair" is substituted for x, in "looking for x" before the phrase-structure rules attach the verb-phrase to the subject to make a sentence. On a first interpretation, "John" is described as having the property of "looking for a little girl with red hair," or as called by linguists
as the non-specific reading. On a second interpretation there will be a derivation which builds up a sentence "John is looking for x," and then substitutes the noun-phrase for x.

Montague formalized only a small fragment of English, but this formalization was complete, which means that the semantics, including the logic, was completely specified. Montague's system of a logical formalization of semantics encourages linguists and logicians to further investigations to see whether the treatment can be extended to larger fragments of natural languages.

II. **SEMANTICS**

A. **An Overview of Semantics**

A great deal of important research in semantics is being carried out today by linguists, philosophers, psychologists, anthropologists and computer scientists, working on a variety of topics in different ways. The change of attitude to "meaning" in American linguistics is more striking than elsewhere, since for so long three assumptions were held which severely discouraged research in semantics:

1) Meaning is inaccessible to observation and hence it is unscientific to study it;

2) A sound semantic analysis must be based on a relatively complete syntactic analysis;

3) Semantics in linguistics is an autonomous discipline, abstracted from matters of belief, custom, context, and other factors yet to be determined.
The first point is contradicted by the fact that speakers are much better at talking about the meaning of words and sentences than about any other aspect of language, because meaning is more accessible to introspection than phonology and grammar. As Chafe states (1970: 75-78):

This unwillingness to recognize the reality of concepts, as well as the phonetic bias from which so much of linguistics has suffered, are both traceable to the very real problems which are inherent in attempts to approach concepts through observable data. . . . The observation of meanings and the establishment of an adequate way of representing them cannot help but be more difficult by a considerable margin. To say that concepts exist, then, is not to say we are able to isolate them in our consciousness at a moment's notice or we have satisfactory ways of representing or discussing them. A proper concern for meanings should lead to a situation where, in the training of linguists, practice in the discrimination of concepts will be given at least as much time in curriculum as practice in the discrimination of sounds.

The second point, basing semantic analysis on syntax, was challenged when Katz and Postal (1964) suggested that if the base component of a grammar contains all the meaningful elements so that transformations will not change meaning, the whole grammar will be simplified. Subsequent work, such as Carol and Paul Kiparsky's paper on factive verbs (1970), shows that by taking into account semantic facts, the syntax is greatly simplified. McCawley (1968) pointed out that many features that are being called syntactic (Animate, Human, Concrete) are really semantic features.

With respect to the autonomy of linguistics, the relevance of logic, beliefs, and content is recognized. Presuppositions have turned out to be important at all levels of semantic analysis; words, sentences,
and utterances in context. A sentence $P$ is presupposed by $S$ in case $S$ implies $P$ and the sentence formed by negating the main verb of $S$ also implies $P$. For example, both (1) and (2) presuppose (3):

1) John knows that the world is round,
2) John doesn't know that the world is round,
3) The world is round.

1. Word Meaning

The notion of semantic fields is a concept developed by Trier and Porzig and further developed and combined with generative grammar by Lyons (1963-1968). The field theory assumes that the way to understand what words mean is to study all the words in a field together and see how they divide up conceptual space, how the words in each field are related to each other. The field theory is most useful for sets of words with considerable content - nouns, verbs, adjectives, some prepositions, adverbs, and some derivational affixes; least useful for grammatical terms, like modals, inflexional affixes, and adverbs like "even" and "yet." One of the advantages of field analysis is that we can better understand the ways in which words can be systematically extended in meaning. Sets of lexical items tend to bear the same relationship to each other in a variety of discourse contexts. There are, however, problems in determining the domain of a field and deciding which lexical items are included in it.

Componential analysis, the technique of decomposing the meaning of words into semantic components comes from Hjelmslev and from studies
Componential analysis presupposes aspects of the field theory in that the investigator looks at a set of words in a carefully delineated area which has basic semantic features in common but whose meanings contrast with each other by virtue of one or more differences in respect to several other kinds of features. The semantic theories of Katz and Fodor (1963), Katz and Postal (1964), and Weinreich (1966) are based on decomposing words into features or semantic markers. Yet, it is not very clear what a semantic component is supposed to be, whether it is just a semantic primitive, a set of basic words, a psychological prime, or a concept of some sort. Some components can be expressed by a word or two (Animate), (Male), while others require at least a whole sentence.

By combining the field theory with componential analysis—that is, by looking at the way in which a semantic field is divided up by the words in it and using that as a basis for deciding what their semantic features are—we can gain important insights into word meaning. Fillmore has described the semantic structure of verbs of 'judging' (accuse, criticize, credit, praise, scold, confess, apologize, forgive, justify and excuse):

1) John accused Harry of writing the letter,
2) John criticized Harry for writing the letter,
3) John credited Harry with writing the letter,
4) John praised Harry for writing the letter.

In (1) John presupposes that Harry is bad and says that Harry is responsible. In (2) John presupposes that Harry is responsible and presupposes
that the act is bad. In (3) John presupposes that writing the letter is good and says that Harry is responsible, while in (4) John presupposes that Harry is responsible and says that writing the letter is good.

The use of binary features along with [+ ] notation is widely used in semantic analysis. Distinctive feature analysis was so successful in phonology that it has been applied to syntax and semantics as well. Animate-Inanimate, Count-Mass, Singular-Plural, Masculine-Feminine, Proper-Common, distinctions have been symbolized as [+ ] or [- ] by using only one term of each pair. The advantage of this notation is that it makes explicit that both features of different sets belong to the same system, i.e. Count and Mass. The disadvantage of this notation is the treatment of unmarked items, such as child.

2. The Lexicon and the Grammar

The division of semantics into the meaning of words and the meaning of phrases is arbitrary and even of methodologically limited use, since many words are paraphrases of phrases or clauses. The major semantic theories have all stressed this point. 'Dentist' is roughly equivalent to 'one who fixes teeth' and 'sadden' is analysed as 'make (someone) sad.' A considerable amount of research has been done on the systematic relationships between certain classes of verbs and prepositions of location and motion (Gruber, 1965), and the relationships between stative, inchoative, and causative constructions, 'be dead,' 'die-kill' (Lakoff, 1970; Binnick, 1970).

In addition to the problem of how to represent these facts, there are genuine differences of substance concerning the equivalence of meaning.
Chafe is somewhat appalled by a "remarkable insensitivity to meaning differences exhibiting any degree of subtlety" (1971:11). Chafe argues that sentences like (1) and (2):

1) The old lady kicked the bucket,
2) The old lady died,

are paraphrases in only vague terms, and the two sentences have a different semantic structure. Even in sentences that are transformationally related, such as actives and passives, the meaning is different in various subtle ways.

Postal's analysis of Remind (1970), in which "remind" is derived from an underlying phrase like "perceive as similar," rests ultimately on whether the two are synonymous. Postal argues that

1) Larry reminds me of Winston Churchill although I perceive that Larry is not similar to Winston Churchill, is contradictory. But the sentence

2) For some reason Larry reminds me of Winston Churchill although I perceive that Larry is not really similar to him at all,

expresses a meaningful and noncontradictory report on the part of the speaker of some subjective experience of his. Postal argues that the underlying verb "perceive" is not equivalent to the surface verb perceive, and "similar" is not equivalent to similar. So, sentence (2) might not be contradictory. Even if "remind" is synonymous with "perceive as similar" on one reading, there remains the problem of the other readings.

In connection with the problem of the relationship between words and constructions, there is the difficulty of possible and impossible
lexical items. Morgan (1968, 1969), Postal (1968) and McCawley (1970) have done interesting work on the things that can be incorporated into a lexical item and cannot. Morgan (1969) argues that only certain kinds of constituent structures may be encoded in a single word, though it is necessary to specify what kinds of constituent structures are involved.

The notion of lexical gap is related to the problem of possible lexical items, but is somehow incoherent. Not every possible but non-existing lexical item constitutes a gap.

McCawley has distinguished between lexical items that are impossible in all languages and those that are impossible to a specific culture. For example, there cannot be a lexical item in English "dotter" meaning "female child of a female parent" such that x is the dotter of y only if y is the mother of x. Other languages, however, have words for such concepts.

The absence of "dotter" in English is a special case of a much more general phenomenon, namely that no English kinship term makes reference to the sex of the "ego" or any of the "linking relatives," e.g. in "x is y's uncle," x's sex is relevant to the choice of uncle rather than aunt, but y's sex is not . . . (1971:13)

Central to McCawley's notion of "possible lexical item in a culture" is a lexical field with a clearly delimited domain, that can be described by a small closed set of components, such as kinship terminology. However, in a domain dealing with artifacts, motion, or emotion in which the membership of words is open, in which the boundaries of the domain are amorphous, and in which it is not at all clear what to include or omit from lexical structure, the matter is obscure.
3. Language and Logic

There are words in every natural language that cannot be analysed adequately by assigning components. These words are logical conjunctors such as: not, and, or; quantifiers, such as: all, some, only; and other words like even and yet. These words affect the meaning of the whole sentence, by bringing in entailments and presuppositions that would be lacking without them. A sentence like

1) Even Charles tried on the jacket,

entails three other statements,

2) Charles tried on the jacket,
3) Other people tried on the jacket,
4) The speaker would not expect or would not expect the hearer to expect Charles to try on the jacket.

Sentence (2) is the main assertion and would remain if "even" did not appear in sentence (1). When "even" occurs in conditional sentences, it has the effect of neutralizing the conditional clause (Fraser, 1969: 68).

G. Lakoff has done interesting work on logic and natural language. He states that in order to understand the sentence

5) The mayor is a Republican and the used car dealer is honest, too,

certain presuppositions are required for the sentence to be grammatical namely, that

8) All Republicans are honest,
9) The mayor is the used car dealer.
However, sentence (10)

10) John is a Republican, but he is honest,
is grammatical only if one expects that Republicans are not honest.

4. Language in Context

Many philosophers have been analysing speech acts. Austin discusses performative sentences, or utterances, in which the "issuing of the utterance is the performing of an action" (1962:6). Some performatives are explicit, such as

1) I promise to buy the record tomorrow,
which constitutes a promise, and

2) I am inviting you for dinner tomorrow,
which is an invitation. Most performatives are, however, implicit.
Ross (1970) has incorporated performative verbs into the semantic structure of sentences, so that sentence (3) would be derived from sentence (4),

3) Go home now,
4) I order you to go home now,
and sentence (5) would be derived from sentence (6),

5) What time is it?
6) I ask you (or I request that you tell me)
what time it is.

Many linguists have worked out many of the conventions of conversation and point out that conversation does not consist of disconnected fragments of discourse, but rather that there are cooperative efforts which participants recognize. G. Lakoff has attempted to formalize some of
these notions, and R. Lakoff (1970) has analysed sentences in the light of discourse conventions. She points out that appropriate answers to the question "what time is it?" might be

7) Three o'clock,
8) I just told Bill it was noon,
9) The sun just came up,
10) None of your business,
11) Why?
12) Ask the policeman.

The following answers would be inappropriate:

13) There are thirty-six inches in a yard,
14) In 1962.

R. Lakoff analyses the conversational principles and the logical deductions that speakers make when confronted with indirect answers like those in sentences 8-12.

B. Current Controversies

There are a few contradictory positions in the dispute between the generative and the interpretative semanticists. Katz is included with Chomsky as a proponent of interpretative semantics. Jackendoff differs from the interpretative semanticists as much as he differs from the generative semanticists. Chafe classifies himself as a generative semanticist, but in some ways his system is unique. The issues on which there is disagreement are directionality, the kinds of rules needed, the order of the rules, and whether transformations change meaning.
Chafe has argued that a language has directionality and that a grammar should reflect this.

There is, then, a kind of directionality in language which might be referred to as the directionality of well-formedness. What this means is that the well-formedness of sentences is determined in one direction from deep (or semantic) structure to surface structure to (eventually) phonetic structure - and not in the reverse direction. (1971:7)

Chomsky (1970), Katz (1970), and G. Lakoff (1969) treat the relationship between sound and meaning as one of mapping, in the mathematical sense, and they disagree with Chafe's claim that mapping from semantics to phonetics is more informative than some other possibility.

Since the generative semanticists start with semantic structure and get eventually to surface structure by means of transformations, projection rules relating deep structures to semantic structure are unnecessary. Katz agrees with the generative semanticists that all meaningful elements are in semantic or deep structure, hence transformations are not allowed to change meaning. Chomsky and Jackendoff hold the view that surface structure contributes to meaning, and so surface structure interpretation rules are needed in addition to base rules, transformations, and output conditions. Katz needs projection rules, while the generative semanticists need, in addition to base rules, transformational rules, and output conditions, global rules or constraints that can retrieve the derivational history of a sentence.

There are a number of issues in the controversy that appear to be matters of methodology. Postal (1969) argued that the best theory is one which has the fewest kinds of rules, hence generative semantics
is better than interpretative semantics because it can do without projection rules and surface structure interpretation rules. However, the generative semanticists need several new transformational rules, rules that convert phrases into single lexical items. The interpretative semanticists do not need such rules. Although fewer kinds of rules are needed, one kind of rule, transformations, must do more kinds of things. McCawley says that:

In such works as Katz and Fodor (1963) and Katz and Postal (1964) semantic structure was treated as something of a very different nature from syntactic structure, and it was only in the years following those works that it became possible for linguists to conceive of the possibility that they might really be the same. (1970)

Katz (1970) argued that in his own theory semantic and syntactic structure were not as different as McCawley suggested.

The major issue over which the various groups of linguists differ is that of lexical insertion. For Chomsky, all lexical items, including terms like "respectively," are inserted after all the base rules and before all the transformational rules. For the generative semanticists, many lexical items will be inserted after some transformations. For example, "cause to become not alive," after several transformations, will be replaced by the lexical item "kill."

Chomsky and Katz have argued that the ideas of the generative semanticists are notational variants of their own theories. Theory A is a notational variant of Theory B if there is an algorithm for getting from one to the other. Their claim may be partially true, as in replacing "become not alive" with "die" or interpreting "die" as "become (not alive)."
However, the current work of the generative semanticists, such as McCawley's research on reference, definite descriptions and other aspects of logical structure, are very fragmented and incomplete, and the interpretative semanticists have done even less on these topics. Therefore it is inadvisable to state that the different systems are notational variants. Moreover, it is premature to predict the empirical consequences of the various theories.
CHAPTER 3

CRITICISM OF SOME GENERATIVE-TRANSFORMATIONAL THEORETICAL PRINCIPLES

INTRODUCTION

This chapter presents the theoretical assumptions and principles which underlie my conception of linguistic description. Some aspects of linguistic theory are also criticized in order to establish a position on certain questions already discussed. This analysis is a necessary methodological preliminary to the formulation of a theoretical descriptive model for the grammar of Portuguese. This model will be the base for the elaboration of an adequate description of the syntactic structures of Portuguese. The first step in developing the model is to establish some criteria to distinguish between syntax and semantics. This distinction seems absolutely necessary after the discussion in the preceding chapters.

I. THEORETICAL AND CONCEPTUAL PROBLEMS IN LINGUISTIC THEORY

A. Dichotomy: Syntax/Semantics

In order to write a description of a given language, a clear conception about syntax is necessary. The two domains of syntax and semantics have to be distinguished, although Chomsky's post-Aspects theory does not clearly define syntax, its primacy is proclaimed.

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This distinction is not necessary for the linguists who say that syntax and semantics are the same.
In the last ten years a new science of semantics has developed out of syntax. Two hypotheses on the nature of semantic structures are accepted as quasi-universals:

1) A minimal unit of the "signified"; the structure of the "signified" is paradigmatic.

2) A unit comprising two "signifieds"; the structure of "signification" is syntagmatic.

The opposites paradigmatic/syntagmatic are postulated by Saussure's conception.

Many linguists, such as Katz, Lamb, McCawley and Leech, agree on the general principle established by Weinreich (1966:417):

The goal of a semantic theory of a language, as we conceive it, is to explicate the way in which the meaning of a sentence of specified structure is derivable from the fully specified meanings of its parts.

I shall define the theoretical notion of syntax in the same way as Hjelmslev, namely, as "an operational hypothesis." Since my purpose is not the description of the semantic structure of Portuguese I do not pursue the details of these theories any further. To recognize and establish a delimitation and opposition between the notions of syntax and semantics, I will define the paradigmatic structure of the "signified."

1. The Structure of the "Signified"

The structure of the "signified" is a fundamental hypothesis to componential semantics, but questioned by generative semanticists. If there is a substitution of
operations like Gruber's "incorporation" (1965), McCawley's "derivation" (1968), or Lakoff's "reification" (1968) processes, imposing a syntagmatic structure on the "signified," a series of transformational reductions makes the "signified" take a paradigmatic surface form. Although this hypothesis seems ingenious there are reasons to doubt its validity.

Generative semanticists base their criticism of the hypothesis on the apparent equivalence of elements, such as *fazer morrer* (cause to die) and *matar* (kill). Lakoff (1965) proposes that this last lexical unit *matar* (kill) be derived from the first by the operations of predicate raising, pruning of S, and lexical incorporation. From (a) we obtain (b) and (c).

(a) Deep Structure

\[
O \text{ Manuel faz o Jorge morrer.}
\]

(Manuel makes Jorge die.)

\[\begin{aligned}
S & \quad \text{NP} \quad \text{VP} \\
\quad \text{Det} & \quad N & \quad V & \quad S \\
\quad o & \quad \text{Manuel} & \quad faz & \quad \text{NP} & \quad \text{VP} \\
\quad \text{Det} & \quad N & \quad morrer & \quad S \\
\quad o & \quad \text{Jorge} & \\
\end{aligned}\]

\[\text{\textsuperscript{2}}\text{McCawley (1968) has proposed an analysis a little different from this type of structure, from a form}
\]
\[O \text{ Manuel faz que o Jorge não seja vivo}\
(\text{Manuel makes that Jorge is not alive}).\]

The criticism of Lakoff's analysis applies to McCawley's analysis as well.
(b) Predicate Raising and S Pruning

O Manuel faz morrer o Jorge.
(Manuel makes die Jorge.)

(c) Lexical Incorporation

O Manuel mata o Jorge.
(Manuel kills Jorge.)

Where S = Sentence
     NP = Noun Phrase
     VP = Verb Phrase
     N = Noun
     V = Verb
     Det = Determiner
But as noted by Fodor (1970) sentences (1) and (2) do not mean the same thing:

1) *O Manuel mata o Jorge no beco.*
   (Manuel kills Jorge in the alley.)

2) *O Manuel faz morrer o Jorge no beco.*
   (Manuel makes die Jorge in the alley.)

The ambiguity of sentence (2) is due to its two deep structures (1') and (2'):

(1')

\[
\begin{array}{c}
S \\
\triangleright Adv Loc \\
\quad \triangleright no beco \\
\quad NP \\
\quad \quad \quad Det \\
\quad \quad \quad 0 \\
\quad \quad \quad N \\
\quad \quad \quad Manuel \\
\quad \quad \quad faz \\
\quad VP \\
\quad \quad \quad S \\
\quad \quad \quad 0 \\
\quad \quad \quad Jorge morre \\
\end{array}
\]

Where Adv Loc = Adverb Locative.
The sentence,

\textit{O Manuel mata o Jorge}  \\
(Manuel kills Jorge),

has the same deep structure as

\textit{O Manuel faz morrer o Jorge}  \\
(Manuel makes die Jorge).

The first sentence should thus have the same ambiguities as the second, but as observed, the sentence

\textit{O Manuel mata o Jorge no beco}  \\
(Manuel kills Jorge in the alley),

is not ambiguous. Therefore, these two types of structures are not equivalent.

This demonstration illustrates the general principle concerning the formalization of linguistic structures.
In a syntagmatic structure it is necessary to establish an order of relations. In the structure of a sentence this order or degree of dependence is realized by the levels of embedding.

In this structure the relation between $V_2$ and $NP_3$ depends on the relation between $V_1$ and $S_2$. Therefore, $VP_1$ empirically precedes $VP_2$; the latter does not exist without the former. Thus, the order of the following rules is absolutely necessary:

1) $S \rightarrow NP \ VP$
2) $VP \rightarrow V \{NP \} \ S$

But in a paradigmatic relation, the concept of rule order is not needed. The following paradigm does not show any priority in the opposition of relations.
The word man is opposed simultaneously to the other elements. It may seem that in the formalization of the rules of paradigmatic relations there would be an empirical priority, but that is not so as the paradigm for the class of demonstratives in Portuguese has the following rules:

1) + Dem. ——— + near
2) - Near ——— + far

Where Dem. 1 corresponds to aquele, Dem. 2 corresponds to esse, and Dem. 3 corresponds to este, respectively. The ordering of the rules of a descriptive system does not contain any dependence.

Formalization shows clearly the intuitive distinction between a syntagmatic structure and a paradigmatic structure. Although both structures may be formalized, they cannot be formalized by means of the same system as hypothesized, for example, in Gruber's "incorporation."
This argument emphasizes Saussure's conception of sign and its essentially internal paradigmatic structure.

2. The Structure of the "Signification"

If it is assumed that the internal structure of the "signified" is paradigmatic, then the structure of the "signification," which is the result of an operation of concatenation of "signifieds," is also paradigmatic. Therefore, there is an isomorphism between the structure of the "signification" and the structure of the "signified."  

I adopt then the isomorphist principle. This principle has the function or the role of an operational hypothesis as proposed by Hjelmslev. The structure of the "signifier" has the configuration of a matrix of distinctive features. These distinctive features are extracted from the representations by bundles of underlying features of the "signifieds." From this underlying representation the necessary system of rules to derive the essential signification of any given sentence is established. The system of rules has the form described for the phonological component.

Once the isomorphist principle is adopted, I postulate a theoretical system of rules to determine certain generalizations concerning the predications realized in a given language. This system is based on the analogy of the morphophonemic rule system which determines

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3 The isomorphist principle is very important in semantics in order to account for difficult problems. The neglect of this principle might explain why so many deficiencies appear in some recent linguistic models.
the generalizations of all possible phonemic combinations, in meaningful units, and also on the analogy of the phonological component rule system. I postulate a system of rules which will determine the transition of an underlying schematic representation into a systematic surface representation. The system of rules will also determine the definitive semantic form of each meaningful constituent, in a manner similar to the system of rules for phonetic realization.

In order to demonstrate the type of rules used to define the implicit automatic operations in some predications we look at the rules of subcategorization proposed by Chomsky in *Aspects*, and the way Chomsky proposes to block the derivation of the sentence.

1) O moço transcorreu.
(The boy elapsed.)

```
S
  NP VP
  Det N V
```

From this deep structure the category N is replaced by a noun extracted from the lexicon. This noun carries a selectional feature of the form NP < Det < ——— > , resulting in the following phrase-marker,

```
S
  NP VP
  Det moço
```

//+ animate//
//− time//
where the noun moco appears under the form of a bundle of inherent features, [+ animate], [- time], as a subcategorization. Once the noun is inserted in its place, the verb is introduced according to its selectional features. It is assumed that the verb transcorrer has a selectional feature of the form

\[ S < NP < - \text{animate} > VP < \quad > >, \text{or} \]
\[ S < NP < + \text{time} > VP < \quad > >. \]

Given the incompatibility of the subcategorization feature of the verb with the feature of the NP subject, the lexical insertion is impossible. The derivation is blocked and cannot take place.

The function of the implicit rule in the selectional feature of the verb is similar to the rule that prevents the formation of certain initial consonantal clusters in the phonological component. The formulation of the cluster |dl| is not blocked by any rule, but simply does not appear in the phonological system of Portuguese, because there is no rule which can make this consonantal sequence possible. The derivation likewise is not blocked by any specific rule. This consideration in phonology leads us to question the value of Chomsky's selectional rules. However, the function of the selectional rules is implicit in the correspondence of the semantic rules with the morphophonemic rules.

3. Formal Rules

In order to establish a transformation rule we must further examine Fillmore's work, already discussed in the previous chapter.
The verb *acusar* is opposed to the verb *criticar* from a paradigmatic structure point of view. In the following sentences,

1) *A Maria acusa a vizinha*  
(Mary accuses the neighbour),

2) *A Maria critica a vizinha*  
(Mary criticizes the neighbour),

it is possible to determine the difference of meaning by means of a description in terms of syntagmatic operations. The following sentences are paraphrases of the preceding sentences:

1') Maria states that the neighbour is responsible for an act which presupposes that she is reprehensible;

2') Maria states that she finds reprehensible an act for which she presupposes that the neighbour is responsible.

(1)  
```
  Maria  
    states  
      neighbour  
        responsible  
          act
```

(1')  
```
  Maria  
    presupposes  
      act  
        reprehensible
```
The common presuppositions demonstrate that the structures imply two different transformations. In the case of *acusar*, there is the incorporation of the feature [+ responsible] to the lexical item "neighbour." In the case of *criticar*, there is the incorporation of the feature [+ reprehensible] to the lexical item "act."

Although the formal demonstration of semantics is beyond the scope of this study, it is evident that generative and interpretative semantics will have to work with formal rules to achieve successful results, following the lines of Lakoff or McCawley, who are working in that direction.

4. Predication Rules

For this type of rule we take again an analogy from the phonological component. The type of rule proposed by Chomsky and Halle (1968) says that the phonetic realization of a given phoneme produces different rules. The variants of the phoneme are determined by the general rules.
of the phonetic system of a language. There is a similarity between this type of rule which determines the phonetic realization form of a phoneme and the phenomenon defined by Weinreich (1966) as "infinite polysemy." Weinreich studies the problem of the characterization of the lexical element and its systematic representation. The lexical verb *comer* (eat) is then considered a polysemic item, based on the differences of meaning in the following sentences:

1) *A criança come uma laranja.*
   (The child eats an orange.)

2) *A criança come a sopa.*
   (The child eats the soup.)

3) *A criança come nozes.*
   (The child eats nuts.)

I postulate, in the semantic component, rules which allow a bundle of semantic features to be realized in a substantial form of meaning, conditioned by its context. These rules are equivalent to the rules of phonetic realization.

With the proposal of these rules I do not claim an absolute solution to the description of semantics. I would like to show that these types of rules could be integrated into a semantic component based on the model of the phonological component. The semantic domain could be limited to a calculus of the matrices of distinctive features which will be the result of a sequence of a finite number of signifieds. This system of rules does not define the notion of possible predication. The semantic component must accept predications as given facts. The notion of possible predication does not reveal the system but the experience. Quine (1951:39-43) refutes all attempts that impose limitations
to experience. In the description of artificial systems constructed to attribute the meanings to predications it is essential to reflect the flexibility which characterizes experience.

5. Subcategorization Rules

In separating syntax from semantics, Chomsky prescribes the form of the integrated model. This integrated model consists of a system of syntactic rules concerning grammaticality and a system of semantic rules concerning the attribution of possible meanings to the syntactic structures. In the beginning of this chapter it was mentioned that in the proposed model in Aspects, the distinction between syntax and semantics was confusing and weak. Chomsky gives three solutions for the description of the following sentences:

1) *A sinceridade admira o moco.*
   (Sincerity admires the boy.)

2) *O moco transcorreu.*
   (The boy elapsed.)

The first and second solutions presented in Aspects are syntactic and the third is a semantic solution. This presentation has created some confusion among transformationalists, who thought that Chomsky favoured a syntactic approach. Then they sought models to describe semantic and syntactic facts with the same mechanism. Transformationalists disagree in their definition of syntax. Fillmore, with his case grammar approach, presents one version of syntax. Chomsky (1968) presents a different notion of syntax in his interpretative semantics approach.
But both are trying to integrate syntax and semantics. Katz (1970) insists on the separation of syntax and semantics. Generative semanticists abandon completely the notion of syntax, or at least, the distinction between syntax and semantics. For example, Weinreich says that the constraints on the co-occurrence of mogo (boy) and transcorreu (elapsed) are of a syntactic nature. Therefore, all the constraints of co-occurrence are syntactic, which leads to the conclusion that syntax and semantics are really one and the same thing.

If we separate syntax from semantics, according to a calculus of the signifier or of the signified, we can demonstrate that the selectional restriction rule, with which Chomsky blocked the derivation of utterances, is well placed in the semantic component. According to my definition, the selectional restriction type of rule belongs to the constraints on the predication or co-occurrence of the "signifieds." I assign this rule to a class of syntactic rules limited to a calculus of the definitive form of the "signifier."

An intuitive remark that the grammar must have the type of selectional constraints of Aspects is too rigid. This rigid selectional constraint rule is in conflict with the simplicity notion that is ascribed intuitively to a grammar. The agrammaticality of the sentence, O mogo transcorreu (the boy elapsed), may be explained as an incompatibility of the features |+ time|, |- time| or |- animate|, |+ animate|, in that given context. The same features are compatible in another content, as in the sentence,

_Uma geração transcorreu_

(A generation elapsed).
In some contexts the sign 'generation' must carry the inherent feature [+ animate] as in the sentence, *Esta geração vive feliz* (this generation lives happily). But in other contexts the sign 'generation' carries the inherent feature [- time], as in the sentence,

*Pense na geração em que nasceu* (Think of the generation into which you were born).

All the subcategorization features postulated by Chomsky are subjected to a gradation of grammaticality. Chomsky's subcategorization features are of a semantic nature. I assign these features to the signification of the matrix of features from the predication of at least two "signifieds." From the predication of these two "signifieds" a definitive form is generated by a system of rules which constitutes the semantic component. Also, Chomsky's subcategorization features are not inherent in the realized features of the surface form of the sentence. The presence of these features is due to a predication which reveals the knowledge or experience of the speaker but not his grammar. Chomsky (1965:157-8) has also pointed out that the constraints expressed by the subcategorization features are not absolute and he gives some contexts where these constraints are not applicable:

1) *A sinceridade não pode admirar a ninguém.*
   (Sincerity cannot admire somebody.)

2) *É ridículo dizer que o livro transcorreu.*
   (It is nonsense to say that the book elapsed.)

In these two sentences the semantic occurrences may be realized. This realization indicates that there is nothing inherent in the signifiers to require the constraints in these sequences. This fact strengthens the distinction between semantics and syntax.
In my view, syntax is the system of grammatical rules operating on the form of the co-occurrence of two or more signifiers. Semantics is also defined as the system of rules determining the definitive form of the matrix of semantic features resulting from any predication. Given these two definitions, I do not exclude the possibility of interference between semantics and syntax. Subcategorization features present an illustration of the semantics-syntax interference. These features are of a semantic nature because their disposition in the matrix of the signification is determined by the rules of the semantic component. However, these features are also predicates because they can be attached optionally to an argument.

Another aspect of these features is that their function is not only semantic. There are some circumstances where their presence is the sole explanation of syntactic forms, such as the use of Male for semantic restrictions and for syntax the pronominalization. The syntactic characteristics show that the presence of the features depends entirely on the type of relation between their referents.

Syntax, then is centred on the definition of the notion of "possible sentence," or a sequence of "signifiers." It follows that it is not necessary to appeal to experience to define the constraints. Any sequence of "signifiers" belonging to a language reveals its predication of "signifiers." The calculus of the system which defines the form of the meaning may be considered as acting independently on the "signifiers" and the "signifieds," respectively. The sequence of the "signifiers" is implicit in the sequence of "signifieds" because the "signifieds"
are always attached to the "signifiers" in a realized sentence. But there would not be any connection between the final form which realizes the sequence of "signifiers" and the final form which realizes the sequence of "signifieds." The system of rules determining the realization of the sequence of "signifiers" is syntax, and the system of rules which determines the realization of the sequence of "signifieds" is semantics. In this light, the dichotomy between syntax and semantics is established.

B. Theoretical Principles and Notions

In this section I discuss some of the theoretical principles and notions of generative transformational theory which will be adopted for the proposed grammatical model. These theoretical principles are based on considering language as a formal system and on intuition. The theoretical notions discussed are creativity, grammaticality and simplicity.

An important characteristic of Chomsky's theory is that his methodology adopts the techniques of experimental science. Chomsky starts with a formal hypothesis and then attempts to verify it. This basic principle of Chomsky's method remains constant throughout his writings. But Chomsky finds a motivation for his hypothesis in the intuitive notion of the speaker about his language.

For the formulation of my model, I will adopt the two following basic principles of Chomsky.
1. **Language as a Formal System**

In postulating the principle of language as a formal system we have to make the analogy of a language with a class of systems where all the structures are formalized, or calculated in terms of a specific structure. We must also recognize that the relations between language and formal systems are analogous. The language itself is not identical to the formal system used for its description. The language of the formal system is a metalanguage used for the description of the given natural language.

2. **The Principle of Intuition**

This principle accepts the validity of intuition as one guide for the formulation of a linguistic model. The principle of intuition accounts for the formulation of basic notions of the model, such as grammaticality, ambiguity and synonymy.

The interaction ambiguity and synonymy has given rise to three notions which are the three constants of the theory: creativity, grammaticality and simplicity.

3. **The Notion of Creativity**

This notion acknowledges that a human being is able to produce and understand whole new sentences. This phenomenon is accounted for in the generative base of the grammatical model by the recursive principle. The recursive rules derive potentially an infinite number of structures. Chomsky had first assigned the recursive property to the
transformational component, which, as became evident, was awkward and inefficient. Katz's and Postal's integrated model shows the recursive principle in the base. In this way, semantic content is confined to the deep structure. Katz's and Postal's proposal makes the grammar more economical, but at the same time it is an anti-intuitive model, because it allows for the generation of a great number of deep structures, and many of these deep structures will never be realized in the surface structure. Thus, they cannot undergo any transformations. The notion of a filtering process is created by Chomsky in *Aspects* to eliminate these non-realized deep structures.

Relativization is one aspect of creativity. At the competence level it may potentially generate sentences of an infinite length, such as:

"I gave it to my friend, who gave it to his friend, who gave it to his friend, who . . . ."

The realization of this operation is accounted for by a recursive rule in the base. This rule has three variations:

(1) Ross's Recursive Rule (1967)

\[
\begin{align*}
S & \longrightarrow \text{NP VP} \\
\text{NP} & \longrightarrow \text{NP S} \\
\end{align*}
\]

\[
\begin{tikzpicture}
  \node (S) {S};
  \node (NP) [below left of=S] {NP};
  \node (VP) [below right of=S] {VP};
  \node (S) [below of=NP] {S};

  \draw [->] (S) -- (NP); 
  \draw [->] (S) -- (VP); 
  \draw [->] (NP) -- (S); 
\end{tikzpicture}
\]
(2) Stockwell's Recursive Rule (1967)

\[
S \rightarrow NP \ VP \\
NP \rightarrow Det \ Nom \\
Nom \rightarrow N \ S
\]

Where Art = Article.

(3) Chomsky's Recursive Rule (1965)

\[
S \rightarrow NP \ VP \\
NP \rightarrow Det \ N \\
Det \rightarrow Art \ S
\]
I shall not discuss here the respective advantages and disadvantages of these three variations. I want to point out, rather, that these three analyses present "parasite structure." Parasite structures as defined by Sevren (1969:51) are the generated deep structures which are never realized as surface structures.

The following phrase-marker

\[
\begin{align*}
S & \rightarrow NP_1 \quad VP \\
& \quad NP_2 \quad S \\
& \quad NP_3 \quad VP \\
& \quad V \quad NP_4
\end{align*}
\]

will derive only sentences of the language if they correspond to the structural description of Relativization. The Relativization transformation has the following form:

\[
\text{SD} \quad \# \quad X \quad \text{NP} \quad [X \quad \text{NP} \quad X] \quad S \quad X \quad \# \\
\begin{array}{cccccccc}
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\
\end{array}
\]

\[
\text{SC} \quad |+ \quad \text{Rel}| \quad \text{SUBSE} \quad 5
\]

Condition if \(3 = 5\)

Every phrase-marker which does not meet the condition is eliminated by the filtering process.

Where SD = Structural Description.
SC = Structural Change.
|+ Rel| = A feature called "Relative."
SUBSE 5 = The node 5 is replaced by the node 3 and the original node is deleted.
Excessive creativity of the base is a deficiency of the model. Intuition, which according to Chomsky's theory, must be the guide, does not present any reason to accept the excess of production as a reality of the language. I thus propose a restriction on the production implemented on the base. This restriction assures us that only the production of structures satisfactory to a structural description of transformation takes place. A restriction rule built into the base makes automatic the rejection of the notion of a filtering process.

4. The Notion of Grammaticality

The adjective grammatical, when used in reference to sentences of natural languages, may be employed in several different senses: for example, that which is "accepted" and/or "understood" by a native speaker and that which is in conformity with the "rules" of some grammar. According to Chomsky, a grammar should produce only and all the sentences of a language which are in accordance with formal grammatical rules. Strange sentences which are formed by the successive application of elementary processes are still grammatical. But if acceptability is taken as the test for grammatical sentences, then some sentences which conform to grammatical rules fail and the grammar should not produce them. If successive application of constructional processes justifies their production, then there is a lapse into the logical circularity
of identifying 'that which is produced by a grammar' with 'grammatical.' Furthermore, if nothing is to be gained by excluding such sentences, neither is there anything of a theoretical nature to be gained by including them, since they are nothing more than the product of elementary constructional processes - processes which in any case would find formulation in any adequate grammar. If acceptability to a native speaker is retained as the sole criterion for deciding grammaticality, it is still empirically true that there are certain sentences which a native speaker will accept without reservation and other sentences which the speaker will have extreme difficulty in judging. Such facts suggest that grammaticality formulated in terms of acceptability is best thought of as a sort of graduated scale. The poles of the scale are found in clearly acceptable and clearly rejected sentences, while between these two extremes lie a set of sentences that are neither readily accepted nor rejected. In light of the extreme subjectivity of the acceptability test, this type of indeterminacy is hardly to be avoided, and marginally grammatical sentences must be taken into account by any theoretical treatment of language in which grammaticality is formulated in terms of intuitive acceptability. Chomsky's statement "let the grammar itself decide" upon the status of a class of indeterminate sentences is open to criticism because grammars are not self-constructing. If grammars for particular languages are not constructed automatically in conformity with some comprehensive theory of language - in which case the question of marginal sentences would not arise - then each step and each statement, formal or otherwise, in a grammar represents a decision on the
part of the linguist who is formulating the grammar. If a particular sentence is produced by a grammar, it is precisely because a rule or a set of rules which produces the sentences has been formulated by the linguist. Conversely, if a particular sentence is not produced by a grammar it is because the linguist formulating the grammar has chosen not to include a rule or set of rules which will produce the sentence (or, perhaps it didn't occur to him). In both cases, it is the linguist and not the grammar who has made the choice.

If it is granted that a grammar for a natural language is not definitional in nature, like the grammar for propositional calculus, but is rather a descriptive account of certain properties which characterize sentences of the language, then it must also be granted that the adequacy, however defined, of the grammar cannot be determined from inspection of the grammar alone. If a grammar for a natural language is to be considered adequate when and only when it produces only and all the grammatical sentences of the language, then adequacy must be determined either by the completeness of the corpus of sentences from which the grammar is abstracted or from the completeness of the corpus of sentences produced by the grammar. That is, a grammar can be shown to be adequate, in Chomsky's terms, if it can be demonstrated that the corpus on which the grammar is constructed is sufficiently comprehensive that the rules abstracted from it will generate only and all the grammatical sentences of the language. Or the grammar can be shown to be adequate if it can be demonstrated that the corpus of sentences produced by the grammar is indeed the set of grammatical, commonly understood sentences
of the language. If it is granted that the grammaticality of a sentence is a function of the sentence's acceptability to a native speaker, then it must also be granted that

a) sentences are not to be considered grammatical simply because they are produced by a grammar;
b) a grammar itself cannot decide cases of marginal grammaticality;
c) a complex sentence containing a number of referential recursions cannot be considered 'grammatical' simply because each recursion has been specified by an elementary rule.

Chomsky's requirement that a grammar produce only and all the grammatical sentences of a language, if understood literally, seems to be unrealistic, since there appears to be no method by which to test whether or not the requirement has been met. Theoretically any language is a potential infinitive set. The adoption of one set, finite or infinite, should be based on the convenience of the grammarian. Because of psychological limitations such as memory, it is better to state that a language is finite.

The analogy between language and formal system gives rise to a unique class of well-formed sequences. These well-formed sentences are the grammatical sentences of the language. Chomsky's originality consists in distinguishing 'grammatical sentences' from 'meaningful sentences.' The sentence "colorless green ideas sleep furiously" meets the conditions of grammaticality. But this sentence does not meet the criterion of common understanding.
The opposition between syntax and semantics has obvious repercussions on the conception of the grammaticality of any model. My conception of grammaticality is similar to the one presented in Syntactic Structures. In this way the model accounts for some phenomena which seem anomalous in the Aspects grammar.

5. The Notion of Simplicity

As Chomsky has remarked, there is no absolute criterion by which to define simplicity. The notion of simplicity seems to be based on a "common sense" criterion.

Simplicity as used in the elaboration of my grammatical model, is based on following criteria:

a) The formulation of generalizations, especially the ones common to all the aspects of the language.

b) Economy of expression, by making use of a strict formalism and using a regular explanation with a minimum of symbols or rules.

c) The preference of a model within the frame of a formal system which accounts for the greatest number of facts according to the native speaker's intuitions about the language.

d) The concern in the description to achieve an eventual theory of universals.

The choice of the most exact model for the description of a natural language is an empirical decision. One criterion for this choice is based on the simplicity notion.
C. The Post-Aspects Notion of Constraints

The post-Aspects period presents a fragmentation of Chomsky's school. A number of models appear which claim to account for the same facts. This section will present some critical comments on the different models and will further establish a basis for developing aspects of my own model.

With regard to the principle of creativity, objections have been raised to the function of the filtering process which Chomsky and others assign to the transformational component. As expressed by Lakoff (1970a), the transformation postulated in this way constitutes a constraint on the derivation. And, if the theory defines the constraints on the derivation, in this sense, the transformation represents an inefficient solution. Ross (1967) reveals this inefficiency by demonstrating the existence of more powerful generalizations concerning the constraints. He presents constraints on the coordination structure. These constraints, affecting the action of a whole class of transformations, must be considered as larger generalizations for a more adequate description.

Constraints operate on Chomsky's selectional rules. The implicit feature rules of the lexical word

```
correr  | NP < + animate > - | (run)
```

are too rigid to correspond to the reality of the language, since the following derivations can be realized.
1) *Este carro corre.*  
(This car runs.)

2) *A bola corre para a criança.*  
(The ball runs towards the child.)

3) *Os meus pensamentos correm.*  
(My thoughts run.)

But the following sentences cannot be realized:

* 5) *A moralidade corre.*  
(Morality runs.)

* 6) *Os aranha-céus correm.*  
(The sky-scrappers run.)

The rejection of sentences (5) and (6) is explained by the fact that these predications have not yet been prescribed by experience. These sentences cannot be blocked by the grammar because the function of the grammar is to assign a form to sentences and not to experience.

Generally, to establish a descriptive model that will represent the intuition of the native speaker, one has to concentrate on constructive operations and not on the restrictive functions of some other operations.

Although Ross's notion of constraints is a valid one, I criticize this notion because incorporating a rule in a grammar would eliminate completely the notion of constraint from the theory. Ross's universal constraints are created to remedy the deficiencies of his analysis of the deep structures. One of these deficiencies is Ross's preference for establishing categories rather than relations.
My point of view on constraints differs from Lakoff's and Ross's. Transformation is not a constraint but a positive step in sentence formation. I reject all filtering notions from the grammar, and all negative approaches such as blocked derivations, filterings, constraints, and restrictions. Instead, I propose a positive approach in constructing rules which specify the derivations but do not block them. This approach is not merely a change in the terminology, but a change of perspective.

1. Perlmutter's Deep Constraints

Perlmutter (1968) points out that some verbs have special properties which impose some restrictions on the identity of the subject or the complement of an embedded sentence. He states (1967:6) that a verb such as persuadir (persuade) can only allow for the embedding of a sentence complement, where the subject and the complement are identical.

An Equi-NP construction:

1) Persuadi o Alberto que começasse a trabalhar.
   (I persuaded Albert to start working.)

---

3Equi-NP = Equivalent Noun Phrase, i.e. the referent Noun Phrase in the subordinate clause is the same as in the main clause.
But there is no possible derivation in such constructions as:

*2) Persuadi o Alberto que (eu) começasse a trabalhar.
   (I persuaded Albert that I started working.)

Where * = symbol used for agrammatical sentences.
Perlmutter (1970:174) in another example suggests that a verb such as *condescender* (condescend) only allows for the embedding of a sentence complement where the subject of the embedded sentence is identical with the subject of the main sentence. An Equi-Subject construction:

3) *O Jorge condescendeu a acompanhar a Maria.*
(Jorge condescended to accompany Mary.)
But there is no derivation for the sentence:

* 4) O Jorge condescendeu a Maria a acompanhar-lo. (Jorge condescended Mary to accompany him.)

These examples show that a faulty grammar presupposes in its hypothesis the existence of this type of constraint. There are only rare cases where a language tolerates two identical occurrences of a sign in the deep structure. If these two identical occurrences are realized, each one has a representation in the surface structure. Therefore, Perlmutter's analysis seems counter-intuitive. In my grammar, where two equivalent identities appear in the same sentence, the grammar takes the first occurrence and generates the other by means of rules. This
grammar would analyse sentence (1), above, in the following way:

(1') *Persuadi o Alberto que começasse a trabalhar.*
(I persuaded Albert to start working.)

Not only is this analysis more economical than Perlmutter's, but it also explains perfectly why sentence (2') - *Persuadi o Alberto que eu começasse a trabalhar* (I persuaded Albert that I start to work) - is agrammatical.

If the auxiliation transformation is applied, the following derivation will take place:
Then, by applying the transformation of complement formation:

we have the choice between (3) or (4):
3) Adjunction que + pronominalization:

```
S
  |
NP   VP
  |
Eu   V   NP
      |
      persuadir
      |
      Det N que VP NP
          |
          O Alberto começar a trabalhar + Pronoun
```

4) Deletion Equi-NP + infinitivization:

```
S
  |
NP   VP
  |
Eu   V   NP
      |
persuadir
      |
      Det N começar a trabalhar
          |
          O Alberto
```

Sentence (3) - *Persuadi o Alberto que começasse a trabalhar* (I persuaded Alberto to start working) - and sentence (4) - *Persuadi o Alberto a começar a trabalhar* (I persuaded Alberto to start to work) - are both surface structures.
The structure *(2)*, presenting two identical NPs, is not a sterile structure, because an obligatory Relativization transformation will apply, following the complement formation, and we will have only one possible derivation:

5) *Persuadi-me que começasse a trabalhar.*
   (I persuaded myself to start working.)

Such analysis leads to the conclusion that there is no place for deep constraints in a transformational grammar. Their presence is the result of faulty analysis which lacks important generalizations such as the Reflexive and direct complement formation.
2. Ross's Constraints

Ross (1967:114) has presented the 'Pied Piper Convention' discussed below:

1) O governo prescreve a espessura da letra da capa dos dossiers.
(The government prescribes the thickness of the lettering of the cover of the files.)
From this convention, the $y$-movement transformation extraposes from this construction any NP. For example, with the application of the Relativization transformation, we could have the following sentences:

2) *O governo que prescreve a espessura da letra da capa dos dossiers abdicará em breve.*

(The government that prescribes the thickness of the lettering of the files will resign soon.)

3) *A espessura da letra da capa dos dossiers que prescreve o governo não chega a dez milímetros.*

(The thickness of the lettering of the cover of the files that is prescribed by the government is less than ten millimetres.)

* 4) *A letra da capa dos dossiers que o governo prescreve a espessura é dourada.*

(The lettering of the cover of the files, that the government prescribes the thickness, is gold.)

* 5) *A capa dos dossiers que o governo prescreve a espessura da letra é preta.*

(The cover of the files, that the government prescribes the thickness of the lettering, is black.)

* 6) *Os dossiers que o governo prescreve a espessura da letra da capa, medem sete por cinco.*

(The files that the government prescribes the thickness of the lettering of the cover, measure seven by five.)

According to the "Pied Piper Convention," the application of the same transformation will allow for the following agrammatical derivations:

* 7) *A espessura que o governo prescreve da letra da capa dos dossiers não chega a dez milímetros.*

(The thickness that the government prescribes of the lettering of the cover of the files does not reach ten millimetres.)

* 8) *A letra que o governo prescreve a espessura da capa dos dossiers é dourada.*

(The lettering that the government prescribes the thickness of the cover of the files is golden.)
Ross remarks that faulty derivations arise each time that there is an extraposition of an NP, if this NP is the most left constituent of another NP. He then suggests a constraint which prevents the extraposition of this type of constituent. Ross (1967:114) names this constraint "Left Branch Condition." For languages such as English, this condition concerns the most left constituent; for languages such as Japanese, it concerns the most right constituent. This condition is called "Right Branch Condition."

It is my opinion that there is no need for any of these constraints for the description of a natural language.

To account for Ross's example I propose the following analysis:

1) O governo prescreve a espessura da letra da capa dos dossiers.
   (The government prescribes the thickness of the lettering of the cover of the files.)
In this analysis it is not necessary to use the rule

\[ NP \rightarrow NP \ (NP) \], which is essential to Ross's analysis.

The constituents \textit{espessura}, \textit{letra}, \textit{capa}, are not NP and therefore cannot be extraposed by the \( y \)-movement transformation. In the case of the Relativization transformation, there are only five possible forms of Relativization for this sentence, one for each NP.

This analysis allows the elimination of Ross's type of constraint and gives more satisfactory results from the universal theory point of view.

The symbol \( F \) is used to designate a constituent and the symbol \( Z \) is used for lexical insertion, it does not have any further expression.
The constraint for the extraposition in this type of analysis is the one proposed by Ross for the complex nounphrase. As an example we present the comparison of a genitive structure after applied transformation,

(a)

```
NP
  Z
  F
```

with the relative structure, after transformation,

(b)

```
NP
  Z
  S
    NP
    F
```
Both of these structures are the result of a deep structure:

\[
\begin{align*}
\text{S} & \quad \text{NP} \\
\text{F} & \quad \text{NP}
\end{align*}
\]

The following sentences are illustrative examples of (a) and (b):

1) *O pássaro canta.*
   (The bird sings.)

2) *O pássaro que canta.*
   (The bird that sings.)

3) *A canção do pássaro.*
   (The bird's song.)

\[(1) \quad \rightarrow \quad (2)\]
Ross considers these structures as different. In the English version, he generates directly from the base the forms (2) and (3).

Where Gen = A genitive constituent.
Ross's proposed analysis needs a constraint.

It is possible to establish an analysis of relative structures for all languages, having in the base a system of not too different rules.

Ross's analysis for Japanese or Portuguese and English of the sentence,

That child eats a big fish
(Aquela criança come um peixe grande),

are as follows:

(1) Japanese or Portuguese analysis
(2) English analysis

```
S • NP F
NP • NP S
```

The base rules for Japanese or Portuguese are:

1) \( S \rightarrow NP \ F \)
   \( NP \rightarrow S \ NP \)

and the base rules for English are:

2) \( S \rightarrow NP \ F \)
   \( NP \rightarrow NP \ S \)
If the aim is the construction of a base which reflects the common factors for predication of all languages, then it is my ultimate aim to construct a system of rules applicable to English, Portuguese, Japanese and every other language. After that, transformations will account for their specific differences.

3. Perlmutter's Surface Constraints

This type of constraint filters derivations of the grammar. There exists several versions of this type of constraint: Ross (1967), Lakoff (1968), Perlmutter (1968), Langacker (1970) and others. As an example I shall consider Perlmutter's (1969) version.

The surface constraint seems as counter-intuitive as Chomsky's filtering devices. These surface constraints are supposed to account for the structures that are capable of generating too large a number of derivations, where some of these generated structures are marked as not well formed.

Perlmutter's surface constraints are clumsy. While Chomsky's filtering rules act on the deep structure level, the surface constraints allow the derivation to take place before marking the ill-formed structures. The uselessness of these surface constraints is evident when we demonstrate the existence of a system of rules of a positive nature. The rules of this system, if formed correctly, do not allow for the generation of ill-formed sentences. Perlmutter's arguments in favour of surface constraints on the Spanish clitic pronoun system are not satisfactory. For each type of structure that Perlmutter wants to block,
there is another structure which can easily be derived by transformations already in the grammar. The information that must be added to the grammar to realize obligatorily the transformations where they must be realized, does not complicate the formulation of the grammar.

These criticisms and others made about grammar devices which have the function of filtering or eliminating the non-grammatical forms of the language, lead to the proposal of a general convention. This convention assures that where an intuitive predication occurs it exists in the language as a corresponding grammatical form. The function of the grammar is to define the form of every given intuitive predication and not to exclude the predications with complex derivations.

D. Generative and Interpretative Semantics

Chomsky states that the logical notion of priority has meaning only in the context of a model which aims at the production or the interpretation of the utterances of the language and not at their characterization. Generative and interpretative semantic theories are opposed to each other by several principles which are not directly based on the distinction of performance/competence. These principles influence the construction of the model. An examination of these principles is presented here.
1. Syntactic and Syntactic-Semantic Features

Weinreich (1966:402) and McCawley (1968:265) have questioned the validity of the distinction made by Katz and Chomsky between semantic and syntactic features. According to Katz the word 'ball' (baile and bola) in the following sentences carry the two features.

1) I observed the ball [+ object]
   (Observei o baile)
   \{ a bola \}
2) I attended the ball [- object]
   (Assisti ao baile)
3) I bounced the ball [+ object]
   (Fiz saltar a bola)

Katz says these are semantic features which have a double function. In sentence (1) the function of these semantic features is to desambiguate the semantic ambiguity. In sentences (2) and (3) their function is to prevent the derivation of ill-formed sentences such as:

* 4) I attended the ball [+ object]
   (Assisti à bola)

According to Weinreich, the function of syntactic features is exactly the same as the function of the semantic features of Katz. Then, in the sentence,

5) This substance is fat
   (esta substância é gorda),

the presence of the features [+ N] or [+ Adj.] prevents ambiguity.

In a similar way, given the following rules

S ———> NP VP
The verbs *queixar-se* (complain), *arrepender-se* (to repent), *atrever-se* (to dare), do not have a non-reflexive form, such as *queixar, arrepender, atrever* - therefore, we could not derive from these forms the reflexive forms by a Reflexivization transformation. These verbs must carry in the lexicon the feature |+ Refl.|, which allows their status to be the same as the verbs which acquire these features by the Reflexivization process.

This Reflexivization |+ Refl.| feature allows for the derivation of the correct forms: *queixo-me* (I complain), *arrependes-te* (you repent), *atreve-se* (he dares); and does not allow the derivation of the ill-forms: *eu queixo, tu arrependes, ele atreve.* This reflexive feature is not a semantic feature, because the synonym of these verbs are not reflexive verbs. The synonym of *atrever-se* is *ousar* but not *ousar-se.* The verb *ousar* then cannot carry the feature |+ Refl.|.

1) *Ousou mentir.*
(He dared to lie.)

* Ousou-se mentir.

Inherent features such as |+Refl.| are distinguished from semantic features by the fact that they bring to the surface structure a characteristic form, without adding anything to the meaning of the sentence.

In this light, I propose another type of feature which overlaps semantics and syntax, and comes from the referent. It is called a 'referential feature.'
As an example of a 'referential feature,' we contrast the feature $\mathbf{+ \text{male}}$ with the inherent feature $\mathbf{+ \text{masc}}$. These will be classified in the same class of features as $\mathbf{+ \text{Refl.}}$. In the sentences:

1) Um bom estudante não falta nunca às aulas  
   (A good student never misses classes),

2) Uma boa estudante não falta nunca às aulas  
   (A good student never misses classes),

1)

```
S
  F
  \não falta nunca às aulas
  NP
  \n  S
  F
  \  bom
  |  estudante
```

2)

```
S
  F
  \não falta nunca às aulas
  NP
  \n  S
  F
  \  boa
  |  Z
  |  F
  |  NP
  |  \- male
  |  estudante
```
the attribution of a sex which characterizes sentence (2) must be considered as an optional predication, though the gender, in this case, [+ masc] is completely a feature of a syntactic nature. This feature does not receive any overt representation in the predicative structure of the sentence. At the same time the type of predicate which presents one unique feature is opposed to the predicates of a paradigmatic semantic structure. These predicates have a lexical representation, which justifies the distinction between semantic and referential features.

2. Logic and Semantic Structures

Generative semantics offers these two types of structures - logic and semantics.

The logical systems available are not able to represent a semantic structure, either at the lexical or proposition levels. The reason is that logic is not concerned with analyzing propositions belonging to the system of possible propositions. Logic is concerned, rather, with determining the truth value of propositions. Logic is concerned with neither a small aspect of the "signification," nor with the analytical aspect.

Weinreich's (1961) and McCawley's (1967) attempts to employ a predicate-calculus system to represent a semantic structure are as useless as Katz and Fodor's attempt to use Boole's logical system. Lakoff (1970) is now attempting to develop a 'natural logic,' which seems to be going in the right direction. Fillmore, with his presupposition theory has contributed to the resurrection of the works of the
'ordinary language philosophers' and Searle's (1968) theory of "Speech Acts," inspired by Austin, has brought new ideas into the field. Leech (1969) has remarked that the linguist would be better off trying to formulate his own logical systems instead of trying to adapt systems from sciences other than linguistics.

Another problem that linguists must attempt to solve is to recognize the limits of semantics in linguistics. Semantics cannot account - as proposed by Lakoff (1970:354) - for "all possible words" in all possible contexts.

Semantic structure is used as the interpretative semantic component of my model. Then, I propose a grammatical model which accounts for the intuitive notion of "syntactic well-formedness." The transformational rules must be distinguished and separated from the interpretative rules or the semantic generation. The function of the transformational rules is to establish an adequate level which is intuitively real and independent of the semantic level. In keeping these two levels separate I avoid rejecting the semantic level. The separation of the two levels does not imply a total separation of syntactic and semantic phenomena. Some predications, such as the referential features, are reflected in the sequence of "signifiers." This sequence is by definition the domain of the syntactic rules. The proposed grammatical model will demonstrate that there is not a separation of semantics and syntax every time that semantics play a role in the
formation of a syntactic form of a sentence. The semantics will act within the syntactic rule frame. The form of the modification is always a form already prescribed by a syntactic rule, as the case of the referential feature + male. This feature fits perfectly in the gender and agreement rules which are rules of a syntactic nature.

In conclusion, the criticisms of the theoretical principles and notions discussed in this chapter constitute the base on which I will seek to establish the foundations for the formulation of my grammatical model. I propose the following notions:

1) The concept of "possible predication" as a notion of possible interpretation for a given predication. The definition of the notion of "possible predication" is hampered by the limitation of our present knowledge in seeking to define the notion of "experience;" it is also hampered by the limitation of linguistics as a science, which should not go beyond the natural limits of verbal articulation.

2) The notion of "sign," defined as a minimal unit of semiotic function. I concentrate on the class of "signs" which carry a verbal "signifier" (similar to de Saussure's conception of "sign").

3) The existence of two systems of interpretative rules, where one system is based on the predication of given "signifieds" and will be able to define the notion of interpretation or possible interpretation of this predication, which is called signification. The other system is based on a sequence of given "signifiers" and will be able to define the notion of possible form of this sequence. This corresponds to the acceptance of Chomsky's notion of grammaticality.
4) The rules which calculate the form of the sequence of the "signifiers" may be of two kinds:
   a) The rules which calculate the syntactic form of any sequence, i.e. a sentence - the syntactic component;
   b) The rules which calculate the phonetic form of the system of "signifiers" - the phonological component.

5) The syntactic component precedes the phonological component, since the syntactic categories play an active role in the determination of the phonological form.

6) The notion of isomorphism of the semantic and phonological components justified by the parallels between the internal structures of the "signifier" and the "signification." These structures are represented by matrices of distinctive features.

7) The syntactic component does not have any constraint or filtering rule type, since to every intuitive given predication corresponds one possible grammatical form.

From these theoretical notions I construct a model of linguistic description. This model should be able to provide a guide for the description of every natural language.
CHAPTER 4

PORTUGUESE SYNTACTIC PROPERTIES

INTRODUCTION

This chapter presents the notation and base rules for the model of a Portuguese grammar. This model deviates in many aspects from Chomsky's traditional theoretical approach, and includes some innovations which will be commented on as they are introduced.

I. NOTATION AND BASE RULES

A. Notation

A new notation\(^1\) is adopted for the presentation of the rules. This new notation has the advantage of providing precision for the formalization of the syntactic description. The description is presented with Friedman's notational system, which has several advantages. First, it allows for a more precise definition of the transformation operations and for an increased number of generalizations. Second, it helps prevent the errors of previous works due to the inaccuracy of structural description. Third, it offers a more elaborate inventory of operations than the ones previously available. This system comprises operations

\(^1\)The notation used in the preceding chapters when commenting on other transformational works was the conventional notation used in those works.
of adjunction (Chomsky's type), and a large scale of operations of incorporation or deletion of features. Finally, Friedman's notational system allows the implementation of this grammar into the computer to verify the syntactic rules of the grammar and to generate new sentences.

An explanation of the formal conventions used here is as follows.

1. **Structural Description**
   - \% Variable
   - A<B> A dominates B directly
   - A/<B> A dominates B
   - A-/<B> A does not dominate B
   - (A, B) A or B
   - ((A, B)) A or B or nothing

2. **Transformational Operations**
   a) ERASE 5 Deletion of 5 in the structural description
   b) 3 ALESE 5 A copy of node 3 is joined as a sister to the left of node 5 and the original node 3 disappears:
c) 3 ARISE 5  idem, but at the right of node 5

d) 3 ALADE 5  idem, but as a last daughter node:

\[
\begin{array}{c}
1 \\
\downarrow  \\
2 \\
\downarrow \\
3 \\
\downarrow \\
4 \\
\downarrow \\
5 \\
\downarrow \\
6 \\
\downarrow \\
7 \\
\downarrow \\
8 \\
\end{array}
\quad 
\begin{array}{c}
1 \\
\downarrow  \\
2 \\
\downarrow \\
3 \\
\downarrow \\
4 \\
\downarrow \\
5 \\
\downarrow \\
6 \\
\downarrow \\
7 \\
\downarrow \\
8 \\
\end{array}
\]

e) 3 AFIDE 5  idem, but as a first sister node

f) 3 ACHLE 5  idem, but adjunction (Chomsky's type) at the left side of the node 5:

\[
\begin{array}{c}
1 \\
\downarrow  \\
2 \\
\downarrow \\
3 \\
\downarrow \\
4 \\
\downarrow \\
5 \\
\downarrow \\
6 \\
\downarrow \\
7 \\
\downarrow \\
8 \\
\end{array}
\quad 
\begin{array}{c}
1 \\
\downarrow  \\
2 \\
\downarrow \\
3 \\
\downarrow \\
4 \\
\downarrow \\
5 \\
\downarrow \\
6 \\
\downarrow \\
7 \\
\downarrow \\
8 \\
\end{array}
\]

g) 3 ACHRE 5  idem, but adjunction (Chomsky's type) at the right of node 5.

h) 3 SUBSE 5  the node 5 is replaced by the node 3 and the original disappears.
The operations ADLES, ADRIS, ADLAD, ADFID, ADCHL, ADCHR, and SUBST correspond to the operations ALESE, ARISE, ALADE, AFIDE, ACHLE, ACHRE, and SUBSE respectively, but without elimination of the original.

i) |+A| MERGEF 3 - The feature |+A| is joined to the bundle of features of node 3.

j) |*A| ERASEF 3 - The feature |+A| disappears from the bundle of features of node 3, and also all the features that are its dependents.

k) |+A| SAVEF 3 - All the features of the node 3 disappear, with the exception of the feature |+A| and all the features that are depending on it.

l) |*A| MOVEF 3 5 - The feature |+A| goes to the node 5, with the values that it has in 3, as well as all the features that are its dependents.

m) |αA| SUBSEF |αB| 3 - The feature |A| replaces the feature |B| in 3, keeping the value α of B.

3. Conditions on the Transformational Operations

a) A & B Condition A and condition B.

b) A/B Condition A or condition B.

c) A, & B/C A and (B or C)
   A & B,/C (A and B) or C.

d) 3 TRM The node is terminal.

e) 3 NUL The node 3 is nul.

f) 3 INCL |+A| The feature |+A| is inclusive in 3.
g) 3 NINCL |+A| The feature |+A| is not inclusive in 3.
h) 3 DOM A The node 3 dominates A.
i) 3 NDOM A The node 3 does not dominate A.
j) 3 NDOMBY A The node 3 is not dominated by A.
k) 3 EQ 5 The nodes 3 and 5 are equal.
l) 3 NEQ 5 The nodes 3 and 5 are not equal.

B. The Base Rules

Base rules constitute a finite system of rules independent of context, and present a relatively fixed form

A → BC

where the order of the rules is strictly determined. They can always be represented by a unique tree diagram which is the phrase-marker.

In the Syntactic Structures model, base-rules have the function of supplying the stratum of the syntactic structure of the sentence and of supplying the morphemes which form the lexical structure.

After Katz and Postal (1964) a third function, recursiveness, is assigned to base rules. Chomsky (1965) adds another function to base-rules: the explicit determination of grammatical functions. However, in one of the grammar versions proposed by Chomsky (solution II), the base rules do not execute the introduction of lexical elements. In post-Aspects works, Chomsky (1967) and Fillmore (1968) have eliminated from the base-rules the determination of grammatical functions. In my study the base-rules have only two important functions:
1) the definition of the notion of possible sentence in terms of a phrase-structure where the nodes represent the grammatical categories;

2) the inclusion of a recursive mechanism which will account for the intuitive notion of creativity of the language.

My theory adopts these principles for the form of the base-rules, but rejects Chomsky's point of view regarding the function of base-rules. The difference between my base-rules and Chomsky's consists in the type of constituent which must be specified by these rules. I propose that what is fundamental in the deep structure of a sentence, rather than the categories, is the notion of grammatical relation and, more specifically, the "constituents of relation" which are four: subject, predicate, complement and predication. This conception is based on two theoretical principles. The first principle takes up the analogy between the base-rules of a generative transformational grammar and the rules of formation of a formal system. In the construction of a formal system a convention (Carnap, 1947) exists according to which something cannot be assigned to the rules of formation which can be realized by means of deductions. This convention has the purpose of limiting the rules of formation to a very small number, expressing the maximum generalizations. The advantage of adopting this principle for the construction of a grammar is to reduce the number of base-rules and to eliminate the traditional categories rather than the functions.

The second principle is connected with the theory of quasi-universals. The linguist attempts to construct a model which can account for
most natural languages and which can make explicit the elements that most of the languages have in common.

Studies on universals such as Greenberg (1961-1963 and 1964-1966) and the works in comparative linguistics of Vinay and Darbelnet (1958) show that when there is a syntactic opposition between languages, it is at the level of grammatical categories. The best way to establish comparisons is to establish what the languages have in common in grammatical relations. Greenberg's syntactic universals are based almost exclusively on the superficial order of the constituents of relation. Where this order is expressed in terms of categories, as in the opposition post-position/ante-position, he supposes a certain equivalence, which will equal the representation supplied by my base-rules. The theory of universals has motivated the elimination, in the base-rules, of the determination of categories with the objective of establishing the constant elements of every natural language. These will be called "predicative structures."

On a basis of the two principles above the functions of the base-rules are defined as follows:

1) to supply a phrase-marker which expresses simultaneously the structure of the relations of the sentence in terms of the elements of the predication and in terms of the only recognized universal constituents which are "the proposition" and "the sign";

2) to account, by means of recursive rules, for the creative aspect of the language;
3) to make explicit two types of generalization:
   a) one concerning the syntactic properties shared by
      all natural languages,
   b) the other concerning the common properties of some
      predicates, independently of their morphologic
      realization.

To account for these functions I propose the following base-rules:

1. \( P \rightarrow F (NP, P) \)
2. \( F \rightarrow Z ((NP, P) NP) \)
3. \( NP \rightarrow (P, Z) \)

The order of applying these rules is strictly determined and
the order of the symbols at the right side of the arrow is significant.

1. Rule 1: \( P \rightarrow F (NP, P) \)

   The initial symbol "P" is used to represent the three notions:
   "phrase," "proposition" and "predication." These notions are distinct
   but nevertheless are linked and partially defined by this first rule.

   Chomsky has limited the notion of "syntactic grammar" to the
   "phrase grammar." Most of the grammars conceived in a generative trans­
   formational frame have adopted this delimitation, with the exception of
   Lakoff (1969). I follow this delimitation and define the sentence as
   "the axiom of the system." This definition does not imply my belief
   that the syntactic processes do not go beyond the limits of the sentence,
   but rather that I choose to place the study of these processes within the
limits that the sentence circumscribes. Rule 1 gives a definition of
P = "proposition" or "Sentence" in terms of the two rules which are im­
licit:

a) P → F NP
b) P → F P

From the point of view of the deep structure form of the sen­
tence, these rules prescribe that a "sentence" consists at least of two
constituents, where one is at the left of the other, and where the con­
stituent at the right has two variables: P and NP.

The notion of "proposition" is reserved for the description of
a P constituent defined as x <P>, where x is a constituent or node of
the P-marker. There exists an absolute identity between the proposition
and the phrase forms, i.e. propositions are by definition phrase-forms.

Rule 1 defines the sentence as "predication," comprising the
notions of "predicate," represented as P<_(NP, P)>, and "subject" rep­
resented as P<F_>.

2. Rule 2: F → Z ((P, NP) NP)

This rule defines F "predicate," and condenses the following
two rules:

1) F → Z

The predicate F may be realized as an element Z, called "sign."²

The predicate F may be assigned to the surface structure by a verb, an

²The element Z called "sign" is the only one to allow for lexical
insertion.
adjective, an adverb, or the like; as in the following sentences, where the predicate is underlined:

a) Amanhã vai chover.  
   (Tomorrow it will rain.)

b) O João vem.  
   (John is coming.)

c) Está nervosa.  
   (She is nervous.)

d) O chefe geral é um bandido.  
   (The general chief is a bandit.)

e) Comega a mocca a dar gritos.  
   (The girl starts to scream.)

2) \( F \to ZP \)

This rule specifies that the direct complement is an embedded proposition in the sentence. Examples of complement \( P \) are underlined:

a) Sai porque ouvi vozes.  
   (I went out because I heard voices.)

b) Ao dobrar a esquina ouvi um barulho.  
   (Turning the corner I heard a noise.)
3) $F \rightarrow Z \ NP \ NP$

This rule specifies that the direct complement and indirect complement are represented by two NP as in the following sentence:

a) O João devolveu o disco ao seu dono.
   (John returned the record to its owner.)

4) $F \rightarrow Z \ P \ NP$

This rule specifies that the direct complement is a P and the indirect complement is an NP. An example is the following sentence.

a) O polícia prometeu-me que não acontecia nada.
   (The policeman promised me that nothing would happen.)

This Rule 2 has the purpose of defining the following relations:

a) "direct complement of " , noted (NP, P) / $F<Z \ %>$;

b) "indirect complement of " , noted NP / $F<Z (NP, P) \ %>$.

3. Rule 3: NP $\rightarrow (P, Z)$

The noun-phrase (NP) is a relation constituent. Its function in deep structure is fixed by its relation to the dominating P. This NP has two possible realizations, given by Rule 3. NP<P> by means of transformations gives a great range of surface structures (nominal groups, nominalizations, adjectivizations, relativizations, infinitivizations, etc. . .).^3 Rule 3 also gives another possible structure of the forms NP<Z>, where according to the definition of the contextual features, the only element that can be inserted is the dummy element $\Delta$.

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^3The exact nature of NP<P> will be made explicit later.
Just as the symbol P of Rule 1 has a double value of a matrix element "sentence" and the embedded element "proposition," the elements F and NP also carry two values. The possible expressions of F predicate and NP subject or complement are parallels, even if matrix constituents or embedded constituents are in question. The elements of the base P, F, NP contrast with the element Z. Z is a lexical entry which does not have any further expansion and must be considered as a "terminal element" in the sense of the term used by Chomsky in Aspects. This is an advantage for the basic structure of this grammar over the previous ones.

It limits the terminal series to a series of unique Z symbols. The series expresses the implicit generalization of other terminologies such as: sign, word, morpheme, predicate, etc. . . . The terms "matrix" and "embedded constituent" are used in this grammar both in an absolute and relative sense. Then, every sentence is a "matrix" and has two "matrix constituents," F and (NP, P). Both nodes are directly dominated by the highest P of the tree. Every expansion of these matrix symbols is considered as an embedding in the matrices F and (NP, P). In adopting the principle of the transformational cycle which consists in following the tree branching from bottom-up by steps of levels of embeddings of P in P, we can refer to any P as a matrix in a given cycle, although in this cycle that same matrix is the object of embedding in the next cycle.

To account for the creative aspect of language, or recursiveness in the representation of language, I adopt the solution of Katz and Postal (1964) and assign the recursive property to the base-rules of the grammar. This grammar distinguishes between four types of recursiveness. In this
way the proposition may be directly embedded as subject (Rule 1: $P \rightarrow F P$); the proposition may be directly embedded as complement (Rule 2: $F \rightarrow Z P$); and the proposition may be indirectly embedded as subject or as predicate, which is a transformed version of an embedded proposition in NP (Rule 3: $NP \rightarrow P$). The fourth type of recursiveness is coordination, which is a particular case and will be fully discussed in this grammar.

The question of order in the base constituents brings up two problems already mentioned:

1) the relation between the model and the mental operations involved in the act of speech;

2) the base of universals (Greenberg).

The representation of mental processes for the creation of sentences by speakers through linguistic base-rules is not feasible. I try instead to construct the most efficient system to represent the most common generalizations of the language's syntactic structures. Greenberg's (1964-1966) point of view, taken up by Ross (1970) and McCawley (1970), that a given language has, in an inherent way, a fixed order for the grammatical functions, is considered here. The word order is given by the base-rules in a left to right manner. T-rules assign the correct surface word order to Portuguese. These base rules do not reflect any specific characteristic pertinent to the Portuguese language only. The assertion of "possible predicative structure" prescribed by the base-rules is an hypothesis which is arbitrary and applicable to any natural language.
II. SYNTACTIC PROPERTIES OF "SIGN"

Language, according to Chomsky's conception of a theory of competence, implies a psychological reality even if there is not a correspondence on the social level. Language can be defined in terms of two constituents:

a) the lexicon - an open class of linguistic signs;

b) the grammar - a structural system with several types of rules.

The syntactic structure rules of the sentence are of two kinds: a) Base Rules - which determine the syntactic form of all the possible predications; and b) Transformational Rules - which determine the surface structure of the sentence from the deep structure prescribed by the base rules and the associated system of signs. In the following discussion we present the second aspect of the deep structure, treated here as the lexicon, or the system of signs of the language.

A. The Sign

The conception of "linguistic sign" is taken from Saussure but modified. Any sign is the arbitrary junction of a "signifier" and a "signified" perceived in terms of an association of a matrix and a bundle of features - phonetic and semantic - defined respectively by alphabets of finite features and by being able to characterize each sign of any natural language. This same combination is also characterized by a second bundle of features - the "syntactic features."
1. **Hypothesis**

This study examines the hypothesis that the syntactic structura-
tion of the sentence is a phenomenon realized independently of the phonetic or semantic form of the sign. The syntactic properties of the sign are three:

a) **Contextual Features** - the properties that determine the syntactic context of the sign in terms of structures prescribed by the base rules.

b) **Categorial Features** - the properties that determine the surface categories which realize the sign.

c) **Inherent Features** - the properties that determine the behaviour of the sign in some specified contexts by a structural description of the transformation.

We note that between the classes of features (b) and (c) there is little difference in function and form. The only real distinction depends on the explicit recognition in Transformational grammar of certain properties such as "categories."

Following is a description of the contextual features of the sign for Portuguese.

B. **Contextual Features**

In *Aspects of the Theory of Syntax*, Chomsky has proposed three ways to introduce the lexical element in the frame given by the base

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4 These syntactic properties of the sign together with the phonetic and the semantic features make up the lexicon. Lexical entries are discussed in Chapter 6.
rules. During the research that followed *Aspects*, most of the transformational works have explored the second solution proposed in *Aspects*. Each lexical element was given a feature or a series of contextual features, positive and negative, describing the possibilities of syntactic co-occurrence in terms of categories and selectional features. This study adopts that solution too, although the form of my proposed contextual features differs from the form proposed by Chomsky. Instead of Chomsky's notation \[ \ldots \] (NP, VP, PP, N V \ldots), I use \(<\ldots >\) (P, F, Z, NP). The main difference between the two descriptions is that the nodes of this analysis differ from Chomsky's categories, which originate in traditional grammar and reveal the usual parts of the discourse and their variants.

Discourse is an element which characterizes a unique type of analysis - at the surface level. The grammatical rules that are formulated in terms of parts of discourse cannot account satisfactorily for syntactic phenomena. The parts of discourse cannot carry a fixed or well-defined value in the grammar and must be defined only as syntactic or morphologic elements. The theory of parts of discourse is an artificial creation. The surface part of discourse is in reality the product of interactions of transformations, where the derivation has several causes: deep structure, inherent features and possible morphologic realizations. The contextual features define a series of syntactic classes - or syntactic categories - the form of which depends on the base rules, but which are not comparable to the traditional categories. The description of these classes will be opposed to "parts of discourse."
The principal function of Chomsky's subcategorization features is to eliminate the surface structures that contain a contradiction in terms of the properties of the verb. Then, to avoid agrammatical sentences such as,

1) * O moço transcorreu
   (*The boy elapsed),

2) * A Maria choveu o gato
   (*Mary rained the cat),

Chomsky assigns to the verbs, subcategorization features to prevent insertion in such derivations. The intransitive verbs will carry the feature /_<NP>/ and the embedded verbs of complements the feature /+_Z/>. Another device to prevent conflicting inherent features in derivations, is the use of |+ animate|, |+ abstract|. To avoid such agrammatical sentences,

3) * O livro correu da biblioteca
   (*The book ran from the library),

4) * O gato comeu a alegria
   (*The cat ate the joy),

Chomsky proposes selectional features such as <+ animate|_NP> for correr (run), and <NP_ |- abstract|> for comer (eat). A semantic theory must assign to the verbs atrever-se (dare) and ousar (dare) a similar semantic description, but cannot point out the syntactic
differences: *atrever-se* is a reflexive verb and *ousar* is not. This example supports the hypothesis that certain syntactic properties are independent of semantics. This hypothesis is based on the notion of syntactic features, including Chomsky's subcategorization features, i.e. the distinction transitive/intransitive which is expressed in these verbs by contextual features; and categorial distinctions, i.e. verb/adjective, accounted for by the categorial features.

In my theory any sign or lexical element is a potential predicate and must possess at least one contextual feature which allows its insertion in a predication. This contextual features prescribes three aspects of the form of the predication. These aspects must be realized before the insertion of the predicate:

1) the form of the subject, either in P, or in NP;
2) the presence or absence of complement(s), i.e. if the predicate is transitive or is not, and if it can or cannot take an indirect complement;
3) the form of the complement, i.e. if the predicate is transitive, the accepted form of the complement is either NP or P.

If there is an indirect complement, the realization is always a NP.

I propose the following list of contextual features:

1. \( F_\_P \)
2. \( F_\_NP_\_P \)
1. Contextual Feature (1): \( F \prec P \)

This first feature characterizes the class of signs that can appear in the context delimited by the corresponding tree and defined by the contextual feature (1). The P-markers of the contextual features illustrate the deep structure and may be different from the surface structure sentence.
This feature allows for the presence of surface auxiliary verbs such as: poder ser (can be), começar (begin), or related verbal expressions such as: ter intenção de (intend to), acabar de (to have just done), pôr-se a (to set out to), etc.

By means of transformations the following sentences can be generated:

1) Pode ser que o João compre lotaria.
   (It can be that John buys lottery tickets.)

2) O João começa a comprar lotaria.
   (John begins to buy lottery tickets.)

3) O João tem a intenção de comprar lotaria.
   (John intends to buy lottery tickets.)

4) O João acaba de comprar lotaria.
   (John just bought lottery tickets.)

5) O João pôs-se a comprar lotaria.
   (John sets out to buy lottery tickets.)

Surface adjectives such as: inútil (useless), evidente (evident), rápido (rapid), may also carry the contextual feature (1).

1) É inútil que o João compre lotaria.
   (It is useless for John to buy lottery tickets.)

2) É evidente que o João compra lotaria.
   (It is evident that John buys lottery tickets.)

3) O João compra lotaria rapidamente.
   (John buys lottery tickets quickly.)

Adverbs such as: amanhã (tomorrow), imediatamente (immediately), infelizmente (unfortunately), evidentemente (evidently), or adverbial phrases: em breve (soon), hoje em dia (nowadays), have the same contextual feature too.
1) Amanhã o João comprará lotaria.
   (Tomorrow John will buy lottery tickets.)

2) Imediatamente o João compra lotaria.
   (John buys lottery tickets immediately.)

3) Infelizmente o João compra lotaria.
   (Unfortunately, John buys lottery tickets.)

4) Evidentemente que o João compra lotaria.
   (Evidently John buys lottery tickets.)

5) Em breve o João compra lotaria.
   (Soon John buys lottery tickets.)

6) Hoje em dia o João compra lotaria.
   (Nowadays John buys lottery tickets.)

The negations such as: não (not), nunca (never), apenas (hardly, scarcely), nem (not even), etc.

7) O João \(\{\não - not \\
nunca - never \\
apenas - scarcely \\
nem - not even\}\) compra lotaria.

Some nouns such as: verdade (true), mentira (false), pena (pity), escândalo (scandal):

8) É uma \(\{\verb|verdade|\}\) que o João compra lotaria.
   It is \(\{\verb|the truth|\}\) that John buys lottery tickets.

9) É \(\{\verb|uma pena|\} que o João compre lotaria.
   (It is \(\{\verb|a pity|\\) that John buys lottery tickets.)
2. **Contextual Feature (2):** $F \prec_{NP} P$

![Diagram](image)

This contextual feature treats the NP transitive predicates and P subjects. In this class comes most of the surface prepositions, such as: 
*sobre* (on), *sob* (under), *com* (with), *em* (in), *cerca* (about).

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*A Helena procura o convite* . . .
(Helen looks for the invitation . . .)

1) *sobre a mesa*  
(on the table),

2) *sob o sofá*  
(under the chesterfield),

3) *com a criada*  
(with the maid),

4) *sem os óculos*  
(without her glasses),

5) *em casa*  
(at home),

6) *cerca das oito*  
(about eight o'clock).
c) Some surface verbs: *importar* (mind, care), *satisfazer* (satisfy, gratify), *animar* (animate), *alegrar* (cheer, delight), *entristecer* (make, become sad), *estranhcar* (surprise), *agradar* (please, gratify).

1) *A Helena procura o convite* ....
   (Helen looks for the invitation ....)

2) *A Helena importa-lhe procurar o convite*.
   (Helen needs to look for the invitation.)

3) *Agrada-lhe á Helena que procure o convite*.
   (It pleases Helen to look for the invitation.)

4) *Que a Helena procure o convite estanha-me*.
   (It surprises me that Helen looks for the invitation.)

3. **Contextual Feature** (3): $F <_P> P^5$

```
  P
 /   \
F     P
 /   \
Z P
```

This feature comprises:

a) The surface conjunctions of subordination, such as *porque* (because), *quando* (when), *já que* (since), *sem que* (without), *a não ser que* (unless that), *com tal que* (so that), *contanto que* (provided that).

---

5The right-hand P is copied onto Z by a transformation.
1) A Marta vai ao cinema porque o taxi chega a tempo.
   (Marta goes to the movies because the taxi arrived on time.)

2) A Marta vai ao cinema já que o taxi chega a tempo.
   (Marta goes to the movies since the taxi arrived on time.)

b) The signs realized in surface verbs such as: implicar (to imply), querer dizer (mean), impedir (to prevent), resultar (result), permitir (allow).

   1) Que o taxi {chega} a tempo {implica} que a Marta vai ao cinema.
      {impede} permite

   (That the taxi arrives on time {implies} that Martha goes to the movies.)

4. **Contextual Feature (4):** F <p> NP

This feature includes:

a) Most of the operator verbs or completive constructions with a P complement, such as prometer (promise), esperar (hope), desejar (desire),
admitir (admit, allow), pensar (think), pedir (request), rogar (ask, beg), tolerar (tolerate), ver (see).

1) {Prometo, hoping} que o professor chegará amanhã.
   (I promise that the teacher will arrive tomorrow.)

2) {Admito, admit} que o professor chega amanhã.
   (I admit the fact that the teacher will arrive tomorrow.)

3) {Rogo, ask} ao professor que chegue amanhã.
   (I ask the teacher to arrive tomorrow.)

4) {Vejo, see} o professor chegar amanhã.
   (I see the teacher arriving tomorrow.)

b) Some "embedded" adjectives, such as: contente (happy), responsável (responsible), seguro (sure).

2) Sou responsável de que o professor chegue amanhã.
   (I am responsible for the teacher's arrival tomorrow.)

3) Estou {contente de} que o professor chegue amanhã.
   (I am happy that the teacher arrives tomorrow.)

3) {Vejo, see} o professor chegar amanhã.
   (I see the teacher arriving tomorrow.)

4) {Rogo, ask} ao professor que chegue amanhã.
   (I ask the teacher to arrive tomorrow.)

3) O pior de tudo é a idéia de que o professor chega amanhã.
   (The worst of it all is the idea that the teacher arrives tomorrow.)

5. **Contextual Feature (5):** F <_NP> NP
This feature comprises:

a) The NP transitive verbs, such as: comprar (buy), vender (sell), arranjar (arrange), imaginar (imagine), dar (give), lavar (wash).

b) The prepositions: em (in, at), de (of), com (with), em frente à (in front of), à volta de (around), sobre (on), em cima de (on).

6. Contextual Feature (6): F <-> NP
This feature characterizes the classes:

a) Intransitive verbs such as: *viajar* (travel), *tossir* (cough), *mentir* (lie).

1) O Carlos

$\{ \text{viaja} \}$

$\{ \text{tosse} \}$

$\{ \text{mente} \}$

$\{ \text{travels} \}$

$\{ \text{coughs} \}$

$\{ \text{lies} \}$

(Charles)

b) Intransitive adjectives, such as: *cinzento* (gray), *siamês* (Siamese), *meigo* (gentle), *esperto* (clever).

2) O gato é

$\{ \text{cinzento} \}$

$\{ \text{siamês} \}$

$\{ \text{meigo} \}$

$\{ \text{esperto} \}$

(The cat is)

c) Most of the predicates that are classified as surface nouns:

*carpinteiro* (carpenter), *homem de negócios* (business man), *aldrabão* (swindler).

3) O Carlos é

$\{ \text{carpinteiro} \}$

$\{ \text{homem de negócios} \}$

$\{ \text{aldrabão} \}$

$\{ \text{carpenter} \}$

$\{ \text{business man} \}$

$\{ \text{swindler} \}$

7. **Contextual Feature** (7): $F < \_NP \_NP > NP$

![Diagram]

- $F$
- $NP$
- $Z$
- $NP$
- $NP$
This predicate accepts structures with two complements:

1) O Marcos, elegêmo-lo presidente.
   (Marc, we elect him president.)

2) A Luisa devolveu à irmã tudo o que The devia.
   (Louisa paid back everything she owed to her sister.)

8. **Contextual Feature (8):** \[ F \prec P \prec NP \] 

   ![Contextual Feature Diagram]

This predicate also structures with two complements.

1) O professor prometeu-me que a Fátima passaria.
   (The teacher promised me that Fatima would pass.)

2) O homem mostrou-me como se usa o escafandro.
   (The man showed me how to use the diving outfit.)

9. **Contextual Feature (9):** \[ NP \prec > \] 

   ![Contextual Feature Diagram]
This class comprises a unique "dummy element" copied with the symbol $\Delta$. Its presence in the grammar arises from the fact that all the signs in the language function as predicates. As a proposition comprises a predication, and each predication comprises at least two constituents where only one can be explicitly the predicate ("F"), there must be an element to fill the function of an argument of a predicate, without being the predicate itself. This element corresponds to an intuitive notion of referent.

Many predicates accept arguments such as subjects, complements, embedded sentences or NP.

1) *Alegra-me que tenhas vindo.*
   
   (I am glad that you came.)

2) *Admira-me que o espectáculo fosse original.*
   
   (I am pleased that the show was original.)

3) *Fiz-lo para que todos benficassem.*
   
   (I did it so that everybody would benefit.)

4) *Fiz-lo para o bem de todos.*
   
   (I did it for the benefit of everybody.)

5) *A criança sentiu o ar frio.*
   
   (The child felt the cold air.)

6) *A criança sentiu que fazia frio.*
   
   (The child felt that it was cold.)

The following sentence has two possible analyses:

1) *Encontrei-o em Cascais.*
   
   (I met him in Cascais.)

   a) *Encontrei-o em Cascais.*

   b) *Em Cascais encontrei-o.*
a)

```
  P
 /  \
F  P
 /   \
Z   NP  F
     /   \
    Z   NP
        /   \
       Z   Eu
      /   \
     Z
```

b)

```
  P
 /  \
F  NP
 /   \
Z   NP
    /   \
   Z
```

```
  P
   /  \
  F  NP
   /   \
Z
```
These two analyses are possible because the predicate *em* has two potential contextual features: \( F_{\_NP}NP \) and \( F_{\_P}NP \). These two features are condensed in the lexical entry of this unit: \( F_{\_\{NP, P\}}NP \).

C. Categorial Features

In the beginnings of transformational grammar theory, the notion of category was considered to be a part of the deep structure supplied by the base-rules. Weinreich (1966) remarks on the superfluity of the repetition of categories created by the base-rules and the categorial features inherent in the lexical item. In *Aspects* (1965:84), Chomsky proposes this type of rule:

\[ N \rightarrow [+ N, +_{\text{Common}}]. \]

His grammar, however, does not make a distinction between the category \( N \) and the categorial feature \( [+ N] \), if the lexical item is introduced by a complex symbol. The "X-Bar Convention" was formulated to account for generalizations such as the structure of nominals, adjectivals and propositions that have an "apparent predicate."

This point of view was criticized in the UESP (1968-69). In order to incorporate this hypothesis, the UESP adopted for the grammar the general form of a predicate calculus, in Fillmore's case grammar sense. The grammatical notions of subject, complement and predicate as defined in my grammar take Chomsky's generalizations. My grammar deviates from the traditional grammatical predicate in the sense of restricting it to "an element containing a finite verb." My grammar here views the
predicate as a characteristic of the base of any lexical item. The function of the predicate category is not of a necessary surface realization. This realization depends on several facts, such as the existence or non-existence of a derivational form in the language. In the negative, the impossibility is noted of derivations by means of "categorial features."

To treat grammatical category as a syntactic property of the sign contrasts with Chomsky's view of category as playing an important part at the level of deep structure. It also differs from the generative semantics practice of excluding all the syntactic categories of the grammar in order to substitute for them classes defined exclusively in terms of semantic features. The Saussurian notion of sign cannot be substituted for a "semantic primitive" to which could be attached different signifiers according to the derived structures. Even if it reached an acceptable notion of synonymy, the sign still has an independent existence. The most current definition of synonymy as an equivalence of intentionality of two semantic units that can be mutually replaced in a given context, proposed by Ziff (1960:172), Leech (1969:29), Katz (1970:8), excludes the role of the signifier to the objects in the rapport of synonymy. This type of definition does not account for the different meaning in the following sentences:

1) _Um oculista é um especialista._
   (An oculist is a specialist.)

2) _Um oftalmologista é um especialista._
   (An ophthalmologist is a specialist.)
3) *Um oftalmólogo é um oculista.*  
(An ophthalmologist is an oculist.)

4) *Um oftalmólogo é um oftalmologista.*  
(An ophthalmologist is an ophthalmologist.)

Sentence (4), on the semantic level, must have a different description than sentence (3) regardless of the pretended synonymy of the "signified" constituents.

Lyons (1963:74-78) states that synonymy is different from other types of relations used in describing the internal structure of the signified, such as antonymy and homonymy. Synonymy is therefore a metalinguistic notion. It is possible to construct a linguistic description without touching synonymy, because native speakers know certain sign relations.

Taking an intermediate position between Chomsky and generative semantics, I give a unique representation for every lexical item, independently of its possible categorial realizations. These realizations are the result of transformational rules.

In brief, categories are only aspects of the surface structure of sentences. Signs do not have the same categories in regard to their potential categorial realization. Each sign must be marked by a bundle of features, showing the scale of its possible realizations. These features are the "categorial features." There are three in this grammar: |+ verb|, |+ adj.|, |+ noun|. Then, from only one underlined signifier, represented in the lexicon, the other two can be derived by transformations:
The lexical representation needs only one categorial feature. The others may be generated by redundancy rules:

\[
\begin{align*}
|+ \text{verb}| & \rightarrow |+ \text{adj.}| \\
|+ \text{adj.}| & \rightarrow |+ \text{noun}|
\end{align*}
\]

These rules express the idea that where there are a verbal form there is always corresponding adjectival and nominal forms. Where there is no verb, but only an adjective, there is only one nominal form possible. And where there is only one nominal form, this one is the only possible surface representation of the sign.

<table>
<thead>
<tr>
<th>+ verb</th>
<th>+ adj.</th>
<th>+ noun</th>
</tr>
</thead>
<tbody>
<tr>
<td>vente</td>
<td>vendido</td>
<td>venda</td>
</tr>
<tr>
<td>existe</td>
<td>existente</td>
<td>existência</td>
</tr>
<tr>
<td>satisfaz</td>
<td>satisfeito</td>
<td>satisfação</td>
</tr>
<tr>
<td>importa</td>
<td>importante</td>
<td>importância</td>
</tr>
<tr>
<td>alegra</td>
<td>alegre</td>
<td>alegria</td>
</tr>
<tr>
<td>-</td>
<td>provável</td>
<td>probabilidade</td>
</tr>
<tr>
<td>-</td>
<td></td>
<td>idéia</td>
</tr>
</tbody>
</table>
There are some exceptions to this generalization. Where the nominal realization is doubtful, the feature [+ noun] can always be omitted from the lexicon, preventing an agrammatical derivation. The main function of the rules is to reflect the generalities of the language and not the exceptions, as was the case of traditional grammars.

Generative semanticists may object to this treatment of categories - for example in accepting *importante* as a transformational derivation of *importar*, and *alegre* as a transformational derivation of *alegrar*. The following tree is a representation of an analysis in generative semantics of the sentence:

1) *O palhago alegra o público.*
   (The clown delights the public.)
The following two sentences may be equivalent from a semantic point of view, but the two structures are not equivalent on the syntactic level:

1) *O palhago alegra o público à noite.*
   (The clown delights the public in the evening.)

2) *O palhago faz com que o público esteja alegre à noite.*
   (The clown causes the public to be happy in the evening.)

An objection to my treatment of categories may be made on the grounds that it confuses two aspects of the language: derivational and the conceptual (Mounin, 1965a-1965b). It could be suggested that the relation between *alegria*, *vender* and *venda*, only points out the morphologic derivation. From a semantic analysis point of view, a morphologic change does not correspond to a semantic change. An example would be the words *prisão* and *cárcere* which by adjunction of the suffix *-eiro* become antonyms: *prisioneiro/cárcereiro*. This type of operation as well as other morphologic derivations of the type *alegre → alegrar*, will be included.

The following is a description of the transformational operations associated with the categorial features already described.

1. **Categorial Feature |+ adj.|**

   The derivation of the adjective from a sign that carries the features |+ verb| is done by a passive transformation: |+ adj|

   1) *O Carlos vende o barco.*
      (Charles sells the boat.)

   2) *O barco é vendido pelo Carlos.*
      (The boat is sold by Charles.)
This transformation has the formula:

a) **Passive Transformation (optional)**

\[
SD \quad P < F < Z \ NP \% > NP
\]

1 2 3 4 5 6

\[
SC \quad | + \text{ por} | \text{ MERGEF 6, 6 ADLES 4, } | + \text{ verb} | \text{ ERASEF 3.}
\]

\[
\text{Cond} \quad 3 \text{ INCL } | + \text{ verb} | & 3 \text{ NINCL } | - \text{ adj.} |
\]

This transformation is optional because it does
not change the meaning of the sentence. Ziff (1960) believes in the
semantic change of meaning of the passive transformation. However, the
syntactic operations of the passive are the same whether or not the passive
changes the meaning of the sentence.

If the passive is considered to be a predication, the passive trans­
formation has the following analysis, plus the condition of the presence
of the passive feature in S to derive a passive. The transformation is obligatory - in this case, with constant operations:

The operations of this transformation are three: subject agentivization, subject and complement permutation, and the passage from verb to adjective.

b) É Insertion Transformation (obligatory)

A second transformation is associated with the realization of the adjective. This is called the "adjunction-é" transformation, which allows A > B.
The adjunction \( \delta \) depends on the fact that the predicate does not carry the feature \(+\) verb\). The presence of a variable in the structural description of the transformation allows the operation of the predicate \( F^<S> \) to have different constituents of \( F \), besides the agentivized subject, such as:

\[
3) \text{O barco } \delta \text{ vendido} \\
\text{(The boat is sold)}
\]

\[
\ldots \text{pelo Carlos} \\
\text{(by Charles)}
\]

\[
\ldots \text{imediatamente} \\
\text{(immediately)}
\]

\[
\ldots \text{a um amigo} \\
\text{(to a friend)}
\]

\[
\ldots \text{quando menos se espera.} \\
\text{(when it is least expected)}
\]

The other transformation associated with the realization of the adjective is the passage of the "attribute adjective" to the "qualificative (or epithet) adjective." This is called the adjectivization transformation:
c) **Adjectivization Transformation** (optional)

SD  \[ NP<P<F<Z F<Z %>>NP>> \]

1 2 3 4 5 6 7 8

SC  5 ALADE 8, 8 SUBSE 7

Cond  4 EQ \( e \)

This transformation is optional because the same structure may constitute a domain of other transformations, resulting in other structures considered as alternatives. Therefore the basic previous structure (C) may give, by Nominalization:

4) *A venda do barco pelo Carlos*
   (The sale of the boat by Charles);

and by Relativization:

5) *O barco que é vendido pelo Carlos*
   (The boat that is sold by Charles.)
These transformations come after the adjectivization in the cycle. The presence of the variable (7) in the structural description is explained by the fact that the adjectivized attribute is always followed by any element associated to it in the same F:

1) **Recordo-me do barco vendido** . . .
   (I remember the boat sold . . .)
   . . . **pelo Carlos**
   (by Charles)
   . . . **a semana passada**
   (last week)
   . . . **em quanto o dono foi de férias**
   (while the owner went on holidays).

The adjectivization is applied to the predicates which do not carry the feature [+ verb], like nouns. Any noun may undergo an adjectivization transformation if it is in a syntactic structure according to the structural description of this transformation. The resulting construction is called "apposition" structure.

1) **O José é presidente do clube.**
   (Joseph is president of the club.)

2) **O José, presidente do clube.**
   (Joseph, president of the club.)
The apposition structure is the adjectivization of a predicate carrying the only categorial feature [+ noun]. A special case of apposition is the association of the noun with its determiner. The transformation of adjectivization joins this determiner with any other element of the NP. Thus, from (A) we obtain (B).

(A)  

(2)  

(B)
The only condition required for the realization of the adjectivization is the presence of the copula \( \epsilon \). The rule predicts correctly that any structure which has undergone the adjunction \( \epsilon \) transformation may be adjectivized. Besides surface adjectives and nouns, surface prepositions also undergo the adjectivization. This way we can generate 1', 2', 3', from 1, 2, 3.

1) \( \text{A jarra está sobre a mesa.} \)
   (The flower vase is on the table.)

2) \( \text{O professor é de Coimbra.} \)
   (The professor is from Coimbra.)

3) \( \text{O disco é da Luisa.} \)
   (The record is Louisa's.)

Adjectivization

1') \( \text{A jarra sobre a mesa.} \)
   (The flower vase on the table.)

2') \( \text{O professor de Coimbra.} \)
   (The professor from Coimbra.)

3') \( \text{O disco da Luisa.} \)
   (Louisa's record.)

This analysis of adjectivization follows Chomsky's *Syntactic Structures* (1957:79). Lees (1960:83) derives the adjectives from the relatives, entailing the operation "Relative Reduction" (Langacker, 1966:283). Lakoff (1965) suggests eliminating, in deep structure, the distinction between verb and adjective, and Ross (1969:352-360) has pursued this research. This analysis, however, is based on a more complex system of base-rules than the method proposed in this study. The analysis of adjectivization which entails the operation of copula deletion seems simpler than the analysis which involves the deletion of the relative plus copula.
2. **Categorial Feature |+ Noun|**

The operations for the realization of the noun are usually treated under "nominalization." Chomsky (1955) treats nominalization as a generic phenomenon. Most of the transformations incorporate a proposition of a subject position in the matrix proposition. Nominalization contrasts with complementation which designates the transformation operating on the propositions of object position, in their integration in the matrix proposition. The ambiguity of the following sentence,

1) Flying planes can be dangerous,
   a) The planes flying are dangerous,
   b) To fly (operate) the planes is dangerous,

is based on two types of nominalization. In the sentence,

2) I like flying planes,

the gerund is the result of a complementation transformation.

Lees (1960) adopts Chomsky's (1958) treatment of nominalization. After Lees, the grammarians included recursiveness in the base rules, and considered nominalization as one transformation or a series of transformations applying to the structure NP<P>.

In this study I reserve the term "nominalization" for the transformations that are directly involved in the formation of a noun from a structure where the given sign may be realized by another category: the transformations that reduce the categorial features of a sign to one feature |+ noun|. The nominalization of other operations such as infinitivization or the adjunction of complementizers (Rosenbaum, 1967) are discussed separately.
Nominalization I formulates the transformation which realizes all the other operations of deletion of categorial features.

a) Nominalization I - Transformation

\[
\text{SD} \quad \text{NP}<P>F (Z F) \text{<S (NP, P) \% (NP, P)<Z>}
\]

\[
\begin{array}{cccccccccc}
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
\end{array}
\]

\[
\text{SC} \quad 5 \text{ SUBSE 3 }
\]

\[
\text{Cond} \quad \text{EQ} \; \varepsilon, \; 6 \text{ INCL} \mid + \text{noun}\]

\[
\text{SC} \quad \text{ERASE} \; 9
\]

\[
\text{Cond} \quad 6 \text{ INCL} \mid + \text{noun}, \; 10 \text{ INCL} \mid - \text{def}
\]

\[
\text{SC} \quad \mid + \text{de}\; \text{MERGEF} \; 7
\]

\[
\text{Cond} \quad 7 \text{ NINCL} (\mid + \text{por}, \; \mid + \text{de}, \; \mid + \text{com}, \; \text{etc.}), \; 6 \text{ INCL} \mid + \text{noun}
\]

\[
\text{SC} \quad \mid + \text{de}\; \text{MERGEF} \; 9, \; \mid + \text{adj}\; \text{ERASEF} \; 6, \; 9 \text{ ALADE} \; 1, \Delta \text{ ADFID} \; 1,(5,3) \text{SUBSE} \; 2
\]

\[
\text{Cond} \quad 6 \text{ INCL} \mid + \text{noun}
\]

An explanation of the operations of this transformation follows.

a) 5 SUBSE 3

This operation establishes the equivalence between adjective and verb and eliminates the copula before an adjective by the adjunction ε-transformation.

1)
If the sentence becomes a proposition as a result of the structure type NP<P>, the nominalization transformation is applied to the results of the adjunction e-transformation in a cyclic rule. After nominalization of the structures (2') we can have (3) but not (3'), due to the condition on the transformation which nominalizes only predicates [+ noun].

(2')

(3)
This operation is concerned with structures where the subject is any indefinite pronoun. In nominalization it is not realized. A structure such as (A) will derive structure (B).

(A)  

NP  

P  

F  

Z  

NP  

F  

Z  

NP  

F  

Z  

NP

(B)  

Nominalization  

canta  

+ noun  
+ adj.  
+ verb  

| canta  |  
- def  |

canta  

a canção
There is also another derivation for this form.

\[(C)\]

\[
\begin{array}{c}
\text{NP} \\
\text{P} \\
\text{F} \\
\text{Z} \\
\text{canta}
\end{array}
\]

\[+ \text{noun} \]

\[+ \text{adj.} \]

\[+ \text{verb} \]

\[(D)\]

\[
\begin{array}{c}
\text{NP} \\
\text{P} \\
\text{F} \\
\text{Z} \\
\text{canta}
\end{array}
\]

\[+ \text{noun} \]

\[+ \text{adj.} \]

\[(E)\]

\[
\begin{array}{c}
\text{NP} \\
\text{P} \\
\text{F} \\
\text{Z} \\
\text{ê}
\end{array}
\]

\[(F)\]

\[
\begin{array}{c}
\text{NP} \\
\text{P} \\
\text{F} \\
\text{Z} \\
\text{canta}
\end{array}
\]

\[+ \text{noun} \]

\[+ \text{adj.} \]
This double derivation illustrates the ambiguity of the sentence,

1) *Gosto da canção*  
   (I like the song),

which has the following paraphrases:

2) *Gosto que cante*  
   (I like that he sings),

3) *Gosto do que canta*  
   (I like what he sings).

Lees (1960:64) says that paraphrase (2) is derived by transformation; Chomsky (1967) says that paraphrase (3) is of a lexical nature. In my opinion all sentences (1, 2, 3) are derived transformationally. The semantic nuance is explained by a difference in the predicative structure. Thus:

\[
\begin{align*}
(1) & \quad (2) & \quad (3) \\
\begin{array}{c}
\text{P} \\
\text{F} \\
\text{NP} \\
\text{Z}
\end{array} & \begin{array}{c}
\text{P} \\
\text{F} \\
\text{NP} \\
\text{Z}
\end{array} & \begin{array}{c}
\text{P} \\
\text{F} \\
\text{NP} \\
\text{Z}
\end{array}
\end{align*}
\]

c) \text{ [+ de]} \text{ MERGEF 7}

The third operation of the transformation concerns the transitive predicates and the incorporation of the feature \text{ [+ de]} in the complement.

1) *O pescador vende peixe.*  
   (The fisherman sells fish.)
2) *O noivo promete voltar.*
   (The boyfriend promises to come back.)

3) *A venda do peixe do pescador.*
   (The sale of the fish of the fisherman.)

4) *A promessa de voltar do noivo.*
   (The boyfriend's promise to return.)

This operation works on the condition that the passive transformation has not been applied to the structure. The application of this last transformation is marked by the presence, in the initial structure, of the feature \(+ \text{por}\). The previous application of the passive does not prevent the nominalization of the structure, but allows for the insertion of the preposition *de* before the complement. Then, (3) is derived from (1):

1) *O peixe é vendido pelo pescador.*
   (The fish is sold by the fisherman.)

2) *A venda pelo pescador do peixe.*
   (The sale of the fish by the fisherman.)

Applying an inversion to the order of this structure the form (3) is more acceptable:

3) *A venda do peixe pelo pescador.*
   (The sale of the fish by the fisherman.)

The order predicate-complement-subject or predicate-subject-complement is purely aesthetic.

d) \(+ \text{de} \) \text{MERGEF 9}

This operation adds the feature \(+ \text{de} \) to the subject of the proposition in all the nominalizations, except in the ones where the subject has already been deleted by the operation ERASE 9. Like all the operations involved in nominalizations, this one does not depend on any special condition, except for the presence of the categorial feature...
+$\text{noun}$ in the predicate, which is essential to derive any nominalization.

The insertion of some prepositions by features rather than by categorial form is based on a purely practical decision - in order to reduce to a minimum the number of symbols used. The repeated presence of a variable between the predicate and direct complement, and the direct and indirect complements, is avoided by the incorporation of the prepositions in the constituents. In this way, in the structural description of the transformation, the structure of the predicate has always the constant and minimal form $F(\text{NP}, (\text{NP}, \text{NP})\%)$, where the variable corresponds to an incorporated predicate that came from the outside of the predication in question.

The treatment of prepositions in context is concerned with elements of two kinds:

1) The elements that are introduced by transformations, without appearing previously, as for example $+$por introduces the passive, and $+$de introduces the nominalization.

2) The elements that are inherent in some predicates and whose position is modified by a transformation. Then, in the lexicon there are predicates like falar $+$de (speak $+$ of), ir $+$a (go $+$ to), sonhar $+$com (dream $+$ with), dar $+$a (give $+$ to). These predicates, having the next transformation applied to them, will acquire the prepositional feature.
b) Preposition Insertion Transformation (obligatory)

\[ \text{SD} \quad P<F<Z ((NP, P) NP) \%>\%
\]
\[ 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \]

\[ \text{SC} \quad 7 \quad \text{MERGEF} \quad 5, \quad 8 \quad \text{MERGEF} \quad 6 \]

\[ \text{Cond} \quad 4 \quad \text{INC} \quad |+ \text{ prep.}| \]

This domain of transformation excludes the predicates which have a non-detachable prepositional form, as in the next examples:

1) \textit{Acaba de chegar}
   (He has just arrived)
   * \textit{De que acaba?}
   \textit{Acaba de quê?}

\textit{Deixou de trabalhar}
   (He stopped working)
   * \textit{De que deixou?}
   \textit{Deixou de quê?}

These predicates are marked by the feature |+ aux|. There is another type of preposition, which has the same form - \textit{de}, \textit{com}, \textit{em} - but is considered as an independent predicate of the lexicon, always with the structure \textit{F<Z _>}

1) \textit{O professor é de Coimbra.}
   (The teacher is from Coimbra.)

2) \textit{Vou ao cinema contigo.}
   (I am going to the movies with you.)

3) \textit{A festa é em casa.}
   (The party is at home.)

Another type of nominalization includes a limited structure of a reduced class of predicates which has a special syntactic property. The unacceptability of the definite article after the preposition \textit{de} prevents a normal nominalization.
1) É um desastre de casamento.
   (It's a disaster of a marriage.)
2) É um amor de criança.
   (It is a lovely child.)

The insertion of the definite articles changes the meaning.

1') É um desastre do casamento.
   (It's a disaster of the marriage.)
2') É um amor da criança.
   (It is a love of the child.)

c) Nominalization II Transformation

This transformation applies only where the predicate belongs
to a special class carrying the feature |+ nom|.

   SD  NP<P<Z F<Z %>>NP<Z %>>
     1 2 3 4 5 6 7 8 9 10

   SC  |+ de| MERGEF 10, |+ adj| ERASEF 6, 5 ARISE 9, 8 SUBSE 1
   Cond 8 INCL |+ nom| & 4 EQ ε

D. Inherent Features

The contextual feature represents the major regularities of each sign. To a great extent, the transformations act on the elements present in the structures described by the contextual features. Any sign may have some special properties that extracts it from its syntactic class and gives to the structure a distinctive form. These properties do not add anything to the semantics of the sentence and only point out a constraint or an additional characteristic of the structure. A non-exhaustive list of the inherent features used in this grammar is discussed here.
This commentary will start with a discussion of the elements realized by a surface verb or by a proposition verb matrix. There are, however, many predicates that are realized in surface structure by other forms, such as: nouns, adverbs, adjectives, prepositions, conjunctions, etc., that may have these features. A more abstract level of deep structure makes it possible, by a series of minimal base rules, to substitute at the surface level facts like the form of the predication marker, or the prepositions *a* or *de*.

1. **Inherent Feature |+ aux|**

Auxiliary is the feature with the syntactic properties of some predicates characterized by a contextual feature \(<_>P\) and a special property in predicates such as *poder* (can), *deber* (ought), *comenzar a* (begin to), *parecer* (seem), *acabar de* (just finish), etc. A transformation associated with the feature |+ aux| supplies the form of the proposition with these predicates:

a) **Auxiliary Transformation (obligatory)**

```
SD      P<Z>P<Z>\%\%> 1 2 3 4 5 6 7 8
SC      |+ verb| MOVEF 6 3, |+ inf| MERGEF 6, 3 ACHLE 5, 4 SUBSE 1
Cond    3 INCL |+ aux|
```
Structure (B) comes from structure (A)

My grammar gives the following analyses for the feature |+ aux|
These auxiliary forms do not function as their correspondent forms of normal verbs. In the normal verbs this form is incorporated into the NP of the complement. In the auxiliary verbs this form cannot be incorporated in the complement because the complement is non-existent.

2. Inherent Feature [+ comp]

The lexical elements carrying this feature are always realized as verbs on the surface structure. They carry one of the two contextual features VP<_P>NP, or VP<_NP>P, which gives them the property of embedding sentences, as subject or as direct complement. The feature [+ comp] marks a special property which allows for an indirect surface complement from the subject of the embedded sentence. Some of the signs that carry this feature are: apetecer (desire), atrever-se (dare), ajudar (help), autorizar (authorise). The presence of the feature [+ comp] explains the grammaticality of (1) and the agrammaticality of (2) for the verb ajudar, which has this feature, but allows the correspondent forms (3) and (4) for the verb prometer (promise) which does not have this feature.

1) O João ajuda a Maria a comprar um anel.
   (John helps Mary buy a ring.)

2) * O João ajuda a Maria a que a filha compre um anel.
   (* John helps Mary that the daughter buys a ring.)

3) O João promete à Maria comprar um anel.
   (John promises Mary to buy a ring.)

4) O João promete à Maria que a filha comprará um anel.
   (John promises Mary that the daughter will buy a ring.)

The transformation is realized by the following operation.
a) Subject Raising Transformation (obligatory)

SD  P<F<Z P<F<Z NP %>NP>>NP>  1 2 3 4 5 6 7 8 9 10
SC  9 ADRIS 4
Cond 3 INCL |+ comp|

The operation copies the embedded subject in position of complement of the matrix verb, without deleting the original. This is explained by different transformations which take the result of the application of subject raising as structural description. This transformation works independently of the identity or non-identity of the NPs in question, unless the identity is specified in the conditions of the transformation. Then, in the case of a predicate carrying the feature |+ comp|, the same operation applies regardless of the surface differences. These surface differences misled the traditional grammarians into making a
The distinction of reflexive versions of normal verbs. The following example illustrates the forms like *sentir* (feel), *pôr* (put, become), *fazer* (make), etc.

1) *A Manuela sente a filha doente.*
   (Manuela feels that her daughter is sick.)

2) *A Manuela sente-se doente.*
   (Manuela feels sick.)

---

This feature of verbs that permit embeddings allows for subject deletion of the embedded proposition in case of identity. The feature [+ SUBDEL] is applied to the predicates which do not have reflexive forms: *admitir* (admit), *apetecer* (desire, long for), *ajudar* (help), *consentir* (consent), *desejar* (desire, want), etc.
1) *O Manuel ajuda a selar os cavalos.*  
   (Manuel helps saddle the horses.)

2) *A Helena deseja comprar um vestido.*  
   (Helen wants to buy a dress.)

The verbs that do not have this feature are not realized in this way at the surface structure, which explains the agrammaticality of sentence (5).

4) *Sei que tenho febre.*  
   (I know that I have a fever.)

5) *Sei ter febre.*  
   (*I know to have fever.)

Many verbs carry the optional feature |SUBDEL|. They are represented by |± SUBDEL|. The forms (6) and (6'), (7) and (7') are the result of an arbitrary selection of possible realizations.

6) *O Mário admite que é desastrado.*  
   (Mario admits that he is clumsy.)

6') *O Mário admite ser desastrado.*  
   (Mario admits being clumsy.)

7) *Ao Mário convém-lhe que seja eleito.*  
   (To Mario it is advantageous to be elected.)

7') *Ao Mário convém-lhe ser eleito.*  
   (To Mario it is advantageous to be elected.)

The transformation associated with this syntactic property is the following.

b) Embedded Subject Deletion I Transformation (obligatory)

\[
\begin{align*}
\text{SD} & \quad P<F<%<Z P<F NP>(NP)>NP>  \\
1 & \quad \text{SC} \quad \text{ERASE} 7  \\
\text{Cond} & \quad 3 \text{ INCL } |+ \text{ SUBDEL}| & 7 \text{ EQ } 8, 7 \text{ EQ } 9
\end{align*}
\]
The presence of the variable 3 in the embedded subject deletion transformation allows this transformation to account also for another case of subject deletion; which is the case of some prepositions and conjunctions, such as \textit{para} (for, to), \textit{até} (until), \textit{sem} (without), \textit{de} (of), \textit{á} (to).

1) \textit{Corri até que apanhei o autocarro.}  
   (I ran until I caught the bus.)

2) \textit{Corri até apanhar o autocarro.}  
   (I ran until I caught the bus.)

---

\textsuperscript{6} This is a surface distinction; at the deep structure level the prepositions have the contextual feature \(F<_P>P\).
The optional transformation for the predicates which allows an embedded subject in the proposition is Embedded Subject Deletion II.

c) **Embedded Subject Deletion II Transformation (optional)**

**SD**  \(P<F\langle Z \ NP \rangle P<F \ NP>\)

**SC**  ERASE 7

**Cond**  \(4 \ EQ \ 7 \ & \ 3 \ INCL \ + \ SUBDEL\)

1) *Prefiro estudar.*  
   (I prefer to study.)

2) *Vejo-a partir.*  
   (I see her leaving.)
The deleted NP is always embedded in the proposition which contains its identity regardless of the position of this NP, whether subject, direct, or indirect complement.

3. Inherent Feature [+ inf]

Connected to the operation of subject deletion is the operation of infinitivization which applies to any structure of proposition without a subject, i.e. \((F, P)<P<F>\).

(B) \[
\begin{array}{c}
(P, F) \\
| \text{Infinitivization} | \\
(P, F)
\end{array}
\]
a) **Infinitivization Transformation** (obligatory)

\[
SD \ %\langle S \ P<F \ Z \ %\rangle \\
1 \ 2 \ 3 \ 4 \ 5 \ 6
\]

\[
SC \ |+ \ inf| \ MERGEF \ 5 , \ |+ \ verb| \ ERASEF \ 5
\]

Cond 1 NEQ NP

The combination of the embedded subject deletion and infinitivization will give structures such as:

1) \(O \ Mario \ admite \ ser \ desastrado.\)
(Mario admits being clumsy.)

2) \(Vejo-a \ partir.\)
(I see her leaving.)

3) \(Prefiro \ estudar.\)
(I prefer to study.)

4) \(Corri \ até \ apanhar \ o \ autocarro.\)
(I ran to catch the bus.)

In Portuguese, there is another type of infinitivization which is the equivalent to nominalization in English. Where English has a gerundive structure, Portuguese has an infinitive structure.

1) The bird's singing woke me up.
\((O \ cantar \ dos \ pássaros \ despertou-me.)\)

The subject of the infinitive proposition does not undergo deletion.

Given this difference in the structure description, a second infinitivization transformation with the structure \(P<F \ NP<P<F \ NP>>\) has to be postulated.

b) **Infinitivization of Subject Proposition Transformation** (optional)

\[
SD \ P<F \ P<F<Z \ %\rangle \\
1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7
\]

\[
SC \ \Delta \ ADLES \ 3 \ |+ \ inf| \ MERGEF \ 5 , \ |+ \ verb| \ ERASEF \ 5 \ (|+ \ de | \ MERGEF \ 4)
\]
c) **Que-Insertion Transformation** (obligatory)

<table>
<thead>
<tr>
<th>SD</th>
<th>%&lt;P&lt;F&lt;Z %&gt;%&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SC</th>
<th>+ que</th>
<th>MERGEF 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cond</td>
<td>4 INCL</td>
<td>+ verb</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SC</th>
<th>+ subj</th>
<th>MERGEF 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cond</td>
<td>P DOM 2</td>
<td></td>
</tr>
</tbody>
</table>

This obligatory transformation supplies the form *que* to the infinitivization of subject proposition.

1) *Que o José vendesse o jaguar surpreendeu-me.*
   (That Joseph sold the jaguar surprised me.)

2) *Que se comprasse a casa foi uma boa ideia.*
   (That they bought the house was a good idea.)

In this type of structure the verb is always in the subjunctive mood, which needs the second structure change of the transformation on the condition that the proposition in question be the subject of the matrix proposition. This transformation predicts that predicates take a proposition as a surface subject and be realized at the surface level as verbs, always taking the subjunctive for the verb in the proposition that functions as surface subject if this one is not infinitivized, as in the following examples:

1) *Alegra-me que tenhas convidado o teu noivo.*
   (I am glad that you have invited your boyfriend.)

2) *Comvem que estejas presente.*
   (It is advantageous for you to be present.)
4. Inherent Feature $\ [+ \ det]$  

This feature characterizes some predicates that have undergone the adjectivization transformation.

There is a sub-class of predicates which comprises the predicates that accept optionally the presence of the determiner.

1) Tres quilos de batatas.  
(Three kilos of potatoes.)

1') Uns tres quilos de batatas.  
(About three kilos of potatoes.)

For this class we used the addition of the inherent features $\ [+ \ det \ ]$, therefore:

a) Adjectivization Transformation (optional)

SD   NP$<$P$<$F$<$Z $F$<$Z $\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$$\%$
E. Referential Features

This term refers to a semantic phenomenon or to a class of predicates. These predicates are distinct from the ones previously discussed because they constitute the signifieds whose signifier does not take the form of a phonetic features matrix. They take the form of a modification in the structure other than the adjunction of a matrix of phonetic features specified by the lexicon. This modification may take several forms. It may be reflected in the order of the surface signifier constituents; it may cause the adjunction or the deletion of some signifiers associated to an order change; or it may influence the intonation or the "supra segmentals" of the sentence. The variants of this phenomenon are globally considered and are treated as predicates, introduced by base rules of predication. The only difference is in the fact that they are not assigned the same graphic representation as the other lexical signs. They are represented by a unique semantic feature called "referential feature." Some others are not even represented in the lexicon, and are introduced by redundancy rules.

1. Referential Feature [+ intg]

This predicate is the interrogation. Its presence is characterized by the following deep structure.

```
F
\|   (P, NP)
P
  \|   [+ intg]
Z
```
Connected with this structure is the following transformation.

a) **Interrogative I Transformation** (obligatory)

sd $P<F<Z>P$

1 2 3 4

sc $|+\text{intg}| \text{MERGEF} 4, 4 \text{SUBSE} 1$

Cond 3 EQ $|+\text{intg}|$

The derived structure meets the structural description of a phonological rule which will give it a characteristic intonation of interrogation in Portuguese.

1) *Você gosta do apartamento novo.*
   (You like the new apartment.)

1') *Você gosta do apartamento novo?*
   (Do you like the new apartment?)

The feature $|+\text{intg}|$ of a verb makes possible an embedded structure.

1) *Perguntei-lhe se ele foi ao teatro.*
   (I asked him if he was going to the theatre.)

2) *Averiguou se se podia visitar o Palácio.*
   (He inquired whether the Palace could be visited.)

3) *(Ele) sabe se o museu está aberto.*
   (He knows the museum is open.)

These cases are incorporated in the Interrogation Transformation if it is modified in this way.

**Interrogative I Transformation** (obligatory)

sd $P<F<Z>(P, P)$

1 2 3 4 5 6

sc $|+\text{intg}| \text{MERGEF} 6$

Cond 6 EQ P & 3 INCL $|+\text{intg}|$

sc $|+\text{intg}| \text{MERGEF} 4$

Cond 3 INCL $|+\text{intg}|$
The other sources for interrogative structures are the so-called "pronouns," or "interrogative adverbs" used by the traditional grammarians. All these forms are produced by the predication $|+ \text{intg}|$. This predicate has two contextual features: $F<_>P$ and $F<_>NP$. The first feature, as discussed above, gives interrogations which do not include the surface pronominal forms. The second feature undergoes the Incorporation Transformation.

b) **Incorporation Transformation** (obligatory)

\[
\begin{align*}
\text{SD} & : P<F<Z>NP<S%/> \\
1 & 2 3 4 5 6 \\
\text{SC} & : |+ \text{intg}| \text{ MERGEF 5, 4 SUBSE 1} \\
\text{Cond} & : 3 \text{ EQ } |+ \text{intg}|
\end{align*}
\]

The structure (B) is derived from (A):

(A) \hspace{1cm} (B)

\[
\begin{array}{c}
\text{P} \\
F \\
|+ \text{intg}| \\
\text{NP} \\
\text{Incorporation}
\end{array}
\hspace{1cm}
\begin{array}{c}
\text{NP} \\
\%
\end{array}
\]

Structures where the interrogative pronoun has the place of an embedded subject or predicate are accounted for by an Incorporation Transformation:

1) *Que quieres?* (What do you want?)
2) *Onde foi?* (Where did you go?)
All the possible forms of Interrogatives are derived by this transformation combined with Interrogation Transformation II.

c) Interrogative II Transformation

\[
\text{SD} \quad P<F<% (NP (NP))>NP> \\
1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \\
\text{SC} \quad |+ \text{intg}| \text{ MERGEF 1} \\
\text{Cond} \quad (4, 5, 6) \text{ INCL } |+ \text{intg}|
\]

This post-cyclic transformation supplies the sentence with the required feature for the phonological component to realize the specific intonation. The predicates that allow embeddings are the exceptions to the rule. A sentence whose matrix predicate carries the feature |+ intg| does not have the interrogative intonation.

The Transformation Interrogation II allows for sentences (1) and (2) but not for (3).

1) Que aconteceu?  
   (What happened?)
2) *Pergunta que aconteceu.*
(He asks what happened.)

3) *Pergunta que aconteceu?*
(Does she ask what happened?)

Structure (3) is grammatical but is derived by Interrogation I Transformation:

The derivation of adverbial or adjectival interrogatives results from the same transformations that characterize the pronouns. The different forms of the interrogative adjectives come from the incorporation of [+ intg] to the different forms of the determiner.
The adverbial forms such as porqué? (why?), como? (how?), quando? (when?), onde? (where?), are structures of the following type.
These predicates need a transformation which deletes the element *que* in their presence.

d) **Interrogative Deletion Transformation** (post-cyclic) (obligatory)

SD  \[ P<Z P<NP<Z>\]  
1 2 3 4 5  

SC  ERASE 3  

Cond  5 INCL  [+ intg], 2 EQ (*como, quando, etc.*)
2. Referential Feature + imp

This predicate or Referential Feature |+ imp| has the contextual feature F_<>_P NP. Associated with this feature is the transformation of Subjunctivization, which permits the derivation of imperative forms.

a) Subjunctivization Transformation (obligatory)

SD  P<F<Z P<F<Z %>%>%NP>
   1 2 3 4 5 6 7 8 9 10
SC  |+ subj| MERGEF 6
Cond 3 INCL |+ imp|
SC 4 SUBSE 1
Cond 3 EQ |+ imp|

This transformation accounts for the imperative cases coming from the predication of the Referential Feature |+ imp| and the cases where this feature is incorporated inherently in another predicate.

Many of the propositions that allow for embeddings require the subjunctive mood in the embedded proposition, marked by the feature |+ imp|. This feature belongs to surface verbs, adjectival, or adverbial forms.

1) Peço-te que venhas visitar-me.
   (I beg you to come visit me.)

2) Disse-lhe que não chegasse tarde.
   (I told him not to arrive late.)

3) Oxalá que tenha sorte.
   (I wish you luck.)

4) Passou-me um cheque para que comprasse uma jóia.
   (He wrote me a check to buy a jewel.)

5) É preciso que venham todos à reunião.
   (It is necessary that everybody comes to the meeting.)
The Subjunctivization Transformation will also derive the correct imperative forms from such structures as:

1) Fazer o jantar.
   (To make dinner.)

\[
\begin{align*}
&\text{faça} \\
&\text{fagas} \\
&\text{Que (não) faz a jantar!}
\end{align*}
\]

In the affirmative, there is another form for the second person: *faç* (make) and *fazei* (make). These forms are derived from the subjunctive by an Imperative Transformation.

b) Imperative Transformation (optional)

SD
\[
\begin{array}{cccccc}
\text{P} < F < \text{Z} > \text{NP} < \text{Z} > & 1 & 2 & 3 & 4 & 5 & 6 & 7 \\
\end{array}
\]

SC
\[
\begin{array}{ccc}
\text{|imp| SUBSE F |subj| 3, ERASE 5} & \text{\{} & \text{\}} \\
\text{Cond} & \text{3 NINCL |+ neg| & 3 INCL |+ subj| & 6 NINQ} & \text{\{} & \text{\}} \\
\end{array}
\]

Then, structure (B) is derived from (A)

(A)

(B)
The special conditions imposed on the subject are required because of the absence of distinctive forms in the imperative for the first person singular and the third person. See the paradigm.

\[
\begin{array}{c}
(Eu) \quad - \\
(tu) \quad diz \\
(você) \quad diga \\
(ele) \quad - \\
(nós) \quad digamos \\
(vós) \quad digais \\
(vocês) \quad digam \\
(eles) \quad - \\
\end{array}
\]

The important characteristic of the imperative is the deletion of the subject (or optionally the inversion of the subject). Deletion takes place where the subject is Pronominalized. The presupposition of the presence of vocatives that accompany these forms is the result of a previous Topicalization, as in:

1) **Maria, traz-me um guardanapo!**  
   (Mary, bring me a napkin.)

2) **Tenha cuidado, avôsinha!**  
   (Be careful, grandmother!)

3. **Referential Feature [+ neg]**

   Negation has a signifier \(não\) which has its place in the lexicon. This form is not always present in every negation. When a constituent carries the feature \(+ \text{ neg}\) preceding the verb or predicate, and if the verb or predicate belong to the same surface proposition structure, the form \(não\) is not realized.

1) **Ninguém se queixou.**  
   (Nobody complained.)

2) **Nunca usa gravata.**  
   (He never wears a tie.)
3) *Nada tenho nada para fazer.*
(I have nothing to do.)

However, the structures:

1') *Não se queixou ninguém*  
(Nobody complained),

2') *Não usa nunca gravata*  
(He never wears a tie),

3') *Não tenho nada para fazer*  
(I have nothing to do),

present a double negative, the form *|não|* and a constituent carrying a feature |+ neg|. The reason for not treating *|não|* as a lexical entry is that the structure of the transformations is simplified if the verb or constituent carrying the feature |+ verb| is the first constituent of F. Any exception to this convention may be realized after the transformational cycle by a post-cyclic transformation determining the definitive form of the constituents surface order.

a) **Negation Transformation** (post-cyclic) (obligatory)

\[
\begin{array}{c}
\text{SD} \\
\text{P<% F<% Z %>%>}
\end{array}
\]

\[
\begin{array}{c}
1 & 2 & 3 & 4 & 5 & 6 & 7
\end{array}
\]

\[
\begin{array}{c}
\text{SC} \\
\text{não ADFID 3, |+ neg| ERASEF 5}
\end{array}
\]

\[
\begin{array}{c}
\text{Cond} \\
2 & 4 & \text{NINCL |+ neg|}
\end{array}
\]

This analysis may be justified by the fact that there is an evident correspondence between the structures associated with the Negation and the Referential features. In observing the surface forms, some result from the predications in |+ neg|, while others result from the predications in |+ intg|, as demonstrated here:
I propose to account for the negation by a predicate |+ neg| to which is incorporated the Negation Transformation, with the following Incorporation Transformation.

b) **Incorporation Transformation (obligatory)**

\[
\begin{array}{cccccc}
\Delta & algo & alguém & um & quando \\
+ \text{int} & \text{que?} & \text{quem?} & \text{que?} & \text{quando?} \\
+ \text{neg} & \text{nada} & \text{ninguém} & \text{ninguém} & \text{nunca} \\
\end{array}
\]

4. **Referential Feature |+ focus|**

The term "focus" is used in Halliday's (1967) sense [see also Lakoff (1969), Chomsky (1968) and Katz (1970)] of "new information." Any predicate may bring the semantic property of an utterance in relation to the reiteration and presupposition functions. That predicate may be marked by a supplementary predication by means of the Referential Feature |+ focus|. This predicate is shown by a syntactic or phonological distinctive form.
The phenomenon of emphasis directly associated with Focalization has an entry in the phonological component and is accounted for by the transformation \( |t\text{emph}| \).

5. Referential Feature \( |+\text{topic}| \)

The elements of Topicalization are not the "focus" or the new information of the utterance. The extraposed constituent belongs semantically to the presuppositions of the utterance. The answer to the question (1) is sentence (2) where the focus is \textit{nada} but the element topicalized is \textit{da festa}, which is the information taken from the question.

1) Que sabes da festa?
   (What do you know about the party?)

2) Da festa, não sei nada.
   (About the party, I know nothing.)

It is difficult to state whether this transformation, like the Passivization, alters the meaning of the sentence. In the affirmative, there is another Transformation of Incorporation of the predicate \( |+\text{topic}| \).

a) Topicalization Transformation (optional)

SD \[ P<\text{F<Z}>(\text{NP}, \text{P}) \text{ NP} \%>(\text{NP}, \text{P}) \] 1 2 3 4 5 6 7 8 9

SC \% ADCHL 1

Cond \% EQ (2, 4, 5, 7, 9) & \% NINCL \( |+\text{focus}| \)
The transformation accomplishes the extraposition of one of the constituents of the structural description, and the final forms always undergo the Pronominalization, to give such structures as:

1) *Na praia, lá divertimo-nos muito.*
   (On the beach, there we enjoy ourselves.)

2) *Na neve, assim vivem os esquimós.*
   (In the snow, that is how the Eskimos live.)

3) *Um pateta, isso é ele.*
   (A foolish man, that's what he is.)

4) *Os hipis, eles deixam-me impávida.*
   (The hippies leave me cold.)

6. Redundancy Rules

The Referential features discussed above are represented in the lexicon and accompanied by a contextual feature. Both the lexicon and contextual feature are inserted in a derivation. There are other Referential Features, however, which do not need a representation because they appear always optionally in the same context. These features may be introduced in the derivation by Redundancy rules.

a) Tense and Aspect

These redundancy rules may be classified in three groups, each one being connected to one of the categorial features.

Connected with the verb is the following group of rules: 7

+ verb → + prog
+ prog → + perf
+ perf → + iter
+ perf → + past
− past → + fut

7 From Gross's (1968) verb treatment.
These rules permit the derivation of all verb tenses represented by the diagram.

This system may derive potential tenses that do not have a distinctive form in the language. The addition, by redundancy rules, of the contextual rule

\[ + \text{iter} \rightarrow - \text{iter} \]

reduces all the bundles of features that do not correspond to distinctive form with distinctive bundles for the rules of the phonological component. The results of this rule correspond to an intuitive reality. Then this rule proposes the iterative present, for which there is not a distinctive form in the language. The iterative present and the simple present have
two semantic values:

1) *Toca bem piano.*  
   (He plays the piano well.)

2) *Toca bem, mas hoje enganou-se.*  
   (He plays well, but today he made a mistake.)

The perfect has also two semantic values, the iterative as in sentences 1 and 4 and the simple perfect as in sentences 2 and 3.

1) *Estive viajando ...*  
   (I have been travelling ...)

2) *Viajei por toda a Europa (e agora vou para casa).*  
   (I have travelled through all Europe (and now I'm going home.)

3) *Viajei por toda a Europa.*  
   (I travelled all through Europe.)

4) *Viajei desde que era criança.*  
   (I have travelled since I was a child.)

For the adjective I propose a Redundancy rule of the type

\[ + \text{adj} \rightarrow + \text{antep}. \]

This rule makes it possible, by the transformation of anteposition of the adjective, to give a characteristic form to the predication "anteposed."

The form of this predication is considered as a reduction of the intensity of the epithet.

1) *As suas brancas cãs faziam-me respeitá-lo.*  
   (His white hair made me respect him.)

2) *As suas brancas cãs preocupavam-me.*  
   (His white hair worried me.)

This predicate could be expressed in terms of presupposition and focus because all occurrences of the anteposition of the adjective (except if it is an inherent feature as *pobre* (poor), *bom* (good)), may be represented where the adjective belongs to the presuppositions and it is not the focus of the utterance.
b) The Determiner

Concerning the noun, the redundancy rules are linked to the dummy element $\Delta$. This symbol must be present for the introduction of any sign realized by a noun. The following rules have the corresponding bundles of features illustrated in the diagram:

$$
\begin{align*}
\Delta & \rightarrow + \text{ def} \\
+ \text{ def} & \rightarrow + \text{ plur} \\
+ \text{ plur} & \rightarrow + \text{ anim} \\
- \text{ plur} & \rightarrow - \text{ anim} \\
- \text{ anim} & \rightarrow + \text{ dem} \\
+ \text{ anim} & \rightarrow + \text{ male} \\
+ \text{ def} & \rightarrow + 1 \text{ pers} \\
+ \text{ anim} & \rightarrow + 2 \text{ pers} \\
- \text{ def} & \rightarrow [\neg 2 \text{ pers}] \\
+ \text{ Def} & \rightarrow - \text{ você}
\end{align*}
$$

\[+ \text{ Def} -
\]

\[+ \text{ Plur} -
\]

\[+ \text{ Anim} -
\]

\[+ \text{ Male} - 1
\]

\[+ \text{ Pers} - +1\text{Pers} -
\]

\[11 +2\text{Pers} - 12 +2\text{Pers} - 13 +2\text{Pers} - 14 +2\text{Pers} -
\]

\[15 +\text{Você} - 16 +\text{Você} - 17 +\text{Você} - 18
\]

\[19 20 21 22 23 24 25 26
\]
The Properties of the Determiner

The reason for linking the Referential features to the dummy element is to realize the total of determiners of the language, under the form of individual surface elements.

The transformation that gives the surface form to the determinant group of nouns is adjectivization (already discussed), which would have the derivations of the type:

<table>
<thead>
<tr>
<th>NP</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z</td>
<td>+ noun</td>
</tr>
<tr>
<td></td>
<td>+ adj</td>
</tr>
<tr>
<td></td>
<td>+ def</td>
</tr>
<tr>
<td></td>
<td>+ plur</td>
</tr>
<tr>
<td></td>
<td>+ anim</td>
</tr>
</tbody>
</table>

etc. . .
The pronoun is another surface element produced by the Redundancy rules on the dummy element. The Redundancy rules, without any transformation, supply the necessary elements to the phonological component to derive all the personal pronouns, without the need for any lexical representation.

Theoretically, the redundancy rules are not exclusively syntactic rules. They prescribe the possible co-occurrence of some predicates and exclude the possibility of others as the predicates that would be at the same time [+male] and [+female] or [+past] and [+fut]. The redundancy rules proposed here are not exhaustive.  

F. Other Inherent Features

[+ masc]

The Referential features just described are predicates or semantic units which are distinguished by their unique characteristic and also because they appear in the sentence in a semantic way, as [+focus], or in a phonological way, as [+intg]. These features are attached to a determined surface category to which a given property provides a distinctive form as specified by the Redundancy rules. This type of feature characterizes the most tenuous relations between semantics and syntax.

---

8There is a large category of Redundancy rules for the diminutives and augmentatives which is not studied here.
It acts like a transition where the semantic element is characterized by its individuality and its internal paradigmatic structure, and the syntactic element characterizes by a system of applied rules. Then, it can be postulated that the semantic feature does not motivate any transformation while the syntactic feature always motivates a transformation. The Referential feature comes between the semantic and the syntactic elements, and it is able to motivate a transformation. In some cases a semantic feature \( |+\ \text{intg}| \) has to be postulated as well as the syntactic feature of the same form \( |+\ \text{intg}| \). In Portuguese, gender illustrates this phenomenon. Any surface noun is marked by gender on the surface. This markedness is an arbitrary procedure, and not determined by a rule or a formalized generalization. Gender will be represented in the grammar by an Inherent feature \( |+\ \text{masc}| \). Sex is marked by the feature \( |+\ \text{male}| \). In the case of predicate-noun and referential pronoun agreement, only one rule is necessary to modify the gender of the noun according to the features of the \( \Delta \) to which it is associated. This rule is realized under the form of the definite article.

The agreement transformation is then formularized.

\[
\begin{align*}
\text{Agreement (obligatory)} \\
\text{SD} & \quad P<F<Z<%>NP<Z \%> \\
1 & \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \\
\text{SD} & \quad *\text{plur} \\
& \quad *\text{anim} \\
& \quad *\text{male} \\
& \quad *1 \text{ pers} \\
& \quad *2 \text{ pers} \\
& \quad *\text{vooe} \\
& \quad *\text{dem} \\
\text{MOVEF} & \quad 5 \quad 3, \quad |*\text{masc}| \quad \text{ERASEF} \quad 3
\end{align*}
\]

There is no neuter gender in Portuguese.
This transformation accounts in one rule for all the generalizations of agreement. All the agreements mentioned by traditional grammars - article and noun, adjective and noun in gender and number, verb and its nominal subject in number and person - are the surface realizations of only one agreement of the predicate with its subject.

In the case of a predication \(|-\ \text{anim}|\), the nominal group takes its surface gender which is the Inherent feature \(+\ \text{masc}\). This rule also has to account for the agreement between determiner and predicate marked by other Inherent features, as for example, the predicates \(\text{gaulos (glasses)}\), \(bēns\) (wealth). These predicates are inherently marked \(+\ \text{plur}\).

The agreement transformation is then reformulated:

**Agreement (obligatory)**

\[
\begin{array}{c}
\text{SD} & F<\text{P}<\text{Z}>\text{NP}<\text{Z}>3 \text{ 4 5 6 7} \\
\text{SC} & |*\text{masc}| \text{MOVEF 6 3,} |*\text{masc}| \text{ERASEF 6} \\
\text{Cond} & 3 \text{ NINCL} |*\text{male}| \\
\text{SC} & |*\text{plur}| \text{ERASEF 6,} |*\text{plur}| \text{MOVEF 6 3,} |*\text{plur}| \text{ERASEF 6} \\
\text{Cond} & 6 \text{ INCL} |*\text{plur}| \\
\text{SC} & |\text{masc}| \text{SUBSEF} |\text{male}| 3 |*\text{masc} | *\text{plur} | *\text{anim} | *\text{dem} | *\text{1 pers} | *\text{2 pers} | *\text{vocō} | \text{MOVEF 3 6}
\end{array}
\]

This rule realizes the agreement and converts the feature \(+\ \text{male}\) from the referential feature into the feature \(+\ \text{masc}\) which derives the surface phonological form of gender.
This chapter had the purpose to explain the most important syntactic properties of the Portuguese sign and a great number of formal operations involved in these syntactic properties.
CHAPTER 5

THE TRANSFORMATIONAL COMPONENT

INTRODUCTION

This chapter analyzes the organization of the transformations in cycles, as well as a certain number of transformations pertaining to the base phrase-marker. The ordering of the transformations within a cycle will also be discussed.

I. THE TRANSFORMATIONAL CYCLE

The transformational component of a grammar consists primarily of a set of transformations, but it must also contain "traffic rules" (Fillmore, 1963) that specify the order in which the transformations are applied. The transformational cycle is used to group transformations into ordered sets, to apply transformations either individually or by transformation set, and to apply a transformation set either once or repeatedly.

A. Pronominalization

The following quotation from Arnauld and Lancelot, in Grammaire Générale et Raisonnée (1660:43-44) confirms the etymologic definition of pronouns as "the words used in place of nouns."
The phenomenon of Pronominalization has been the object of many detailed studies. Most of these studies have concentrated on a morphologic or semantic aspect of the pronoun, while Chomsky's linguistic theory has emphasized the syntactic properties of the pronoun.

An examination of the transformation treatments of Pronominalization is presented here, followed by a proposed treatment of Pronominalization.


The transformation of Pronominalization is not treated by Chomsky in the first proposed system of transformations. The first formulation of this rule is outlined by Lees and Klima (1963), using the framework of Chomsky's 1957 model. Lees and Klima propose two types of Pronominalization rules: an intra-propositional rule which produces the reflexive form, and an inter-propositional rule which formulates the anaphoric non-reflexive forms. These Pronominalization rules are thus formulated (1963:152).

1) Reflexive Rule:

\[
X - \text{Nom} - Y - \text{Nom}' - Z
\]

Cond \( 2 = 4 \)

where Nom = a nominal
and X, Y, Z = variables.
2) Pronoun Rule:

\[ X - \text{Nom} - Y - \text{Nom'} - Z \quad 1 \quad 2 \quad 3 \quad 4 \quad \text{pron} \quad 5 \]

\[ 1 \quad 2 \quad 3 \quad 4 \]

\[ \text{Cond} \quad 2 = 4 \]

where 3 is in a matrix sentence
and 4 is in a constituent sentence
embedded within that matrix sentence
which contains 2.

These rules are still proposing two classes of transformations: singular and generalized. The generalized transformations are able to account for embeddings. Although very elementary, these formulations present the expression of a syntactic regularity which justifies syntactically the formal difference between the reflexive and the anaphoric pronouns. They bring some innovations to the theory of the pronouns, including the pronominal forms, without necessarily including the realization of deletion. These rules also suggest the double nature of the operation, the adjunction of the pronoun, and the EQUI-NP deletion, which establishes the link between two phenomena: Pronominalization and deletion. In the following sentences,

1) \textit{Ela vai à baixa e ela compra um perfume} \\
(She goes downtown and she buys perfume),

2) \textit{Ela vai à baixa e compra um perfume} \\
(She goes downtown and buys perfume),

the rules of Lees and Klima show that the link between these sentences is the fact that they undergo the same deletion and that their difference is the optional choice of an anaphor in the context of a coordination of equi-subjects.

However, the rules of Lees and Klima bring out some problems, such as the omission of every specification of meaning of their identity sign and their "noun" element.
Chomsky's new model (1965) further clarifies the transformational studies of Pronominalization. In Aspects (1965:145-6), Chomsky examines the possibility of treating the notion of possible referent by a feature or index which, under the condition of identity with another in the same context of noun-phrase, would allow for the Pronominalization transformation. In case of a different index the transformation is blocked. Then, the sentence,

1) O gato vê o gato
   (The cat sees the cat),

cannot be derived if the respective referents of the formal identities are different. In case of identity of the referent, the reflexive Pronominalization is obligatory. However, the problem of Pronominalization is more complex than Chomsky suggests. The following examples,

1) Quando o Manuel comprou um carro em Lisboa,
   o João comprou outro no Porto
   (When Manuel bought a car in Lisbon, John bought another one in Porto),

2) Quando o Manuel comprou um carro em Lisboa,
   o João comprou um carro no Porto
   (When Manuel bought a car in Lisbon, John bought a car in Porto),

could only be explained by a very refined theory of the referent. For instance, why is there co-referentiality in sentence (1) and not in sentence (2)? Sentence (1) would pronominalize, although not as a result of co-referentiality. Since co-referentiality has a semantic implication, it will not be treated in the Pronominalization.

2. Ross (1967-1969)

Ross's study ("On The Cyclic Nature of English Pronominalization," 1969) presents the most simple formalization of Pronominalization.
In sentences like:

1) The possibility that Fred will be unpopular doesn't bother him,

2) The possibility that Fred will be unpopular doesn't bother Fred,

3) Fred isn't bothered by the possibility that he will be unpopular,

4) Fred isn't bothered by the possibility that Fred will be unpopular,

Ross remarks that Pronominalization is a bi-directional phenomenon. Sentences (1) and (2) pronominalize bi-directionally, but sentences (3) and (4) do not pronominalize. Bi-directional Pronominalization may be of two types: forward and backward. Forward Pronominalization occurs with equi-identity. Backward Pronominalization may only occur if the anaphor is in the subordinate clause of the sentence that contains the antecedent. Ross proposes the following rule:

\[
\begin{array}{ccc}
\text{SD} & X & \llbracket \text{NP} \quad \text{Pro} \quad "A" \rrbracket \quad Y \quad \llbracket \text{NP} \quad \text{Pro} \quad "A" \rrbracket \quad Z \quad \text{(obligatory)} \\
1 & 2 & 3 & 4 & 5 \\
\end{array}
\]

\[
\begin{array}{cccc}
\text{SC} & (a) & 1 & 2 & 3 & 4 & \text{[+ Pro]} & 5 & \text{Cond 2 Dom 4} \\
(b) & 1 & 2 & 3 & 4 & 5 & \text{Cond 4 Dom 2,} \\
& & & & \text{[+ Pro]} \\
\end{array}
\]

where "A" corresponds to the "index of reference" proposed by Chomsky (1965).

Ross's rules account for the following paradigms, where ante or post adverbial propositions are optional.

1) Quando foi ao exame, o Jorge não sabia nada.
   (When he went to the examination, George did not know anything.)
2) Quando o Jorge foi ao exame, não sabia nada.
   (When George went to the examination, he did not know anything.)

3) o Jorge não sabia nada, quando foi ao exame.
   (George did not know anything when he went to the examination.)

4) * Ele não sabia nada quando o Jorge foi ao exame.
   (* He did not know anything when George went to the examination.)

Ross suggests that in the transformational cycle, the Pronominalization takes place after the Anteposition Adverbal transformation which is optional. Sentence (1) is the result of the Anteposition of the adverb, followed by Backward Pronominalization. Sentence (2) is the result of the Anteposition of the adverb followed by a Forward Pronominalization. Sentence (3) is the result of a Simple Pronominalization. And sentence (4) is impossible; the Backward Pronominalization cannot apply.

3. Langacker (1969)

In the article "On Pronominalization and the Chain of Command" (1969), Langacker concludes that the facts of Pronominalization cannot be explained by the notion of subordination. The following example,

1) Ao professor que conhece um estudante que precisa de uns livros, o João oferece-lhos
   (To the teacher who knows a student who needs books, John gives them to him.)

has this structure:
The underlined items are the Pronominalized forms in the surface structure.
In concluding that,

neither a constraint based on linear ordering nor a constraint based on relative depth of embedding is sufficient to handle pronominalization in conjoined sentences (ibid: 165),

Langacker contradicts Ross's principle of Pronominalization.

In the process of explaining the phenomenon of Pronominalization,

Langacker defines his own notion of command:

We will say that a node A "commands" another node B if
(1) neither A nor B dominates the other; and (2) the S-node that most immediately dominates A also dominates B (ibid:167).

From this notion, Langacker formulates his Pronominalization rule:

NPa may be used to pronominalize NPP unless (1) NPa precedes NPP; and (2) either (a) NPP commands NPa, or (b) NPa and NPP are elements of separate conjoined sentences (ibid:168).

4. Lakoff (1968b)

In the article "Pronouns and Reference" (1968), Lakoff wants to demonstrate that neither Ross's nor Langacker's rules can account for all the facts of Pronominalization. He points out two paradigms which contradict Ross's and Langacker's rules.

1) A Maria viu um elefante perto dela.
   (Mary saw an elephant near her.)

2) Perto dela, a Maria viu um elefante.
   (Near her, Mary saw an elephant.)

3) * Perto da Maria (ela) viu um elefante.
   (* Near Mary, she saw an elephant.)

4) * (Ela) viu um elefante perto da Maria.
   (* She saw an elephant near Mary.)

According to the notions of domination or of command proposed by Ross and Langacker, sentence (3) is grammatical, although intuition suggests the contrary.
Lakoff shows that adverbial expressions and the phenomenon of Topicalization are very difficult problems to explain.

1) *O carro que tem, quando o comprou o José?*  
(The car that he has, when did Joseph buy it?)

2) *O carro que tem o José, quando o comprou?*  
(The car that Joseph has, when did he buy it?)

These two sentences have the same analysis.

Sentence (1) may be explained by a Pronominalization followed by Topicalization:

3) *Quando comprou o José o carro que tem?*  
Topicalization → *O carro que tem, quando o comprou o José?*
Sentence (2) would presuppose the Pronominalization of José 2, an operation from the bottom up, which is not allowed in a cyclic rule.

4) O José comprou o carro que tem.

Pronominalization $\rightarrow^*$ Ele comprou o carro que tem o José.

This type of Pronominalization is prescribed by Ross's and Langacker's rules. Lakoff states that Pronominalization cannot be a cyclic transformation, because the rules of Anteposition of the adverb or Topicalization require the transformation to be preceded or followed by Pronominalization. Ross (1967) had stated that a post-cyclic rule imposed conditions on the Forward Pronominalization. Lakoff argues that Pronominalization cannot be post-cyclic. According to Lakoff the only way to account for Pronominalization is by means of Ross's (1967) or Perlmutter's (1970) constraints. Although Lakoff's demonstrations seem to have some validity in the context of his base structure, his conclusions cannot be supported because of the error in the base rules.

An adequate deep structure and the notion of cyclic transformation can accurately account for Pronominalization. Pronominalization is thus treated in this study as cyclic transformation, in line with the proposals of Ross (1969) and Langacker (1969).

Before presenting the treatment of Pronominalization in this Portuguese grammar, some transformations associated with the surface form of the adverb must be discussed first.
5. **Adverbialization**

The Adverbialization transformation has the function of deriving the structures that are traditionally labelled adverbials. The Adverbialization transformation comprises any predicate in which the subject is a proposition and carries the operation to incorporate it in the F of that same proposition.

This transformation has the following formalization:

\[
\text{Adverbialization (obligatory)}
\]

\[
\text{SD} \quad P \left< Z \left< Z \right> \right> P \left< F \left< Z \right> \right> ^{>}
\]

\[
\text{SC} \quad 2 \text{ ARISE 8, 5 SUBSE 1}
\]

\[
\text{Cond} \quad 3 \text{ NINCL |- adv|}
\]

Structure (B) is derived from structure (A):

\[
\text{(A)} \quad \text{(B)}
\]

This transformation derives sentences such as the following, where the adverbialized predicates are underlined:

1) *Tocou a sonata lentamente.*
(He played the sonata slowly.)
2) Atravessei o Oriente de camelo.
(I travelled through the Orient on a camel.)

3) Sairei quando deixe de nevar.
(I will go out when it stops snowing.)

4) Os soldados defenderam-nos valentemente.
(The soldiers have defended us bravely.)

There are a certain number of predicates that undergo this transformation arbitrarily. These elements will be marked with the inherent feature \( \pm \text{adv} \); if marked \( \mp \text{adv} \) they will give rise to other derivations. These are forms such as: \textit{incrível} (incredible), \textit{evidente} (evident), \textit{irônico} (ironic), \textit{inconceivível} (inconceivable), \textit{possível} (possible), \textit{provável}, etc. that have double possibilities.

\[
\begin{align*}
1) \text{E} & \begin{cases}
\text{evidente} & - \text{evident} \\
\text{inconceivível} & - \text{inconceivable} \\
\text{irônico} & - \text{ironic} \\
\text{possível} & - \text{possible} \\
\text{provável} & - \text{probable} \\
\end{cases} \begin{cases}
\text{que há capelas na serra.} \\
\end{cases} \\
\end{align*}
\]

\[
\begin{align*}
2) \begin{cases}
\text{Evidentemente} & - \text{Evidently} \\
\text{Possivelmente} & - \text{Possibly} \\
\text{Provávelmente} & - \text{Probably} \\
\end{cases} \begin{cases}
\text{that there are chapels on the mountains.} \\
\end{cases}
\end{align*}
\]

Another class of predicates that cannot be adverbialized seems to undergo a semantic change; such as:

1) \textit{Ja basta que seja feia.}
(It's already enough that she is ugly.)

2) \textit{É bastante feia.}
(She is very ugly.)

3) \textit{Falaram-me estranhamente.}
(They spoke to me in a strange manner.)

4) \textit{É estranho que me falassem.}
(It's strange that they spoke to me.)
The solution for these cases would be to consider them as homophonous forms and have two entries in the dictionary. One form would carry the feature \(|-\text{adv}|\), and the other form would not.

Another aspect of the adverb that does not alter the grammar is its position in the sentence, which is a surface phenomenon.

1) *Silenciosamente desceu a escada.*  
(Quietly he went down the stairs.)

2) *Desceu silenciosamente a escada.*  
(He went quietly down the stairs.)

3) *Desceu a escada silenciosamente.*  
(He went down the stairs quietly.)

The only positional restriction of the adverb is that it cannot be extrapoosed out of the preposition in which it is embedded. Thus, sentence (5) could not be derived from sentence (4).

4) *O repórter disse que o Presidente viajava secretamente.*  
(The reporter said that the President was travelling secretly.)

5) *O repórter disse secretamente que o Presidente viajava.*  
(The reporter said secretly that the President was travelling.)

This restriction explains the following sentences.

1) *Acabo no entanto, de entrevistá-lo.*  
(However, I have just interviewed him.)

2) *Acabo de vê-lo no gabinete.*  
(I have just seen him in the office.)

3) *Acabo no gabinete de vê-lo.*  
(*I have just in the office seen him.*)
1) no entanto
    F
    P
    Z
    P
    F
    P
    Z
    NP
    acabó de
    Z
    NP
    Eu
    vê
    ele

2) acabó de
    F
    P
    Z
    NP
    F
    P
    Z
    NP
    Eu
    no
    gabinete
    Z
    NP
    F
    NP
    vê
    ele
These structures justify the transformation which derives adverbs from predicates $F<_{-%}>P$ of the deep structure. There is also the transformation of the Anteposition of the adverb, as in Ross (1969), and the transformations explaining the operations of extraposition of the adverb within the same proposition.

**Anteposition of Adverb** (post-cyclic) (optional)

<table>
<thead>
<tr>
<th>SD</th>
<th>P$&lt;<em>{-%}&gt;F&lt;</em>{--%}&gt;P_{-Z}&gt;<em>{-Z}&gt;</em>{-Z}$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5 6 7 8</td>
</tr>
</tbody>
</table>

| SC | 4 AFIDE 1                        |
|    | Cond 5 NINCL |+ inf| |

This condition excludes the possibility of anteposition in case of Infinitivization and blocks the derivation of (2) from (1).

1) *Começa a cantar.*
   (He starts to sing.)

1') *Promete estudar.*
   (He promises to study.)

2) *A cantar começa.*
   (*To sing he begins.)*

2') *Estudar promete.*
   (*To study he promises.)*

This transformation allows for the derivation of (2) from (1).

1) *Tocava gaita*
   (He played the harmonica)

2) *Com sentimento (with feeling)*
   *De burro (on the donkey)*
   *À meia-noite (at mid-night)*

   *Habilmente (with hability)*
   *Sem que ninguém lhe ensinasse (without being taught)*
   "tocava gaita (he played)"

This transformation is post-cyclic and operates in a movement inside the proposition.

Another problem concerning the adverb is the traditionally so-called suffix *mente* which is attached to some structures. The forms may be realized by carrying the inherent feature \( \pm \text{mente} \), which would produce the transformations in the phonological component with correct constructions:

\[
\begin{align*}
\text{Dansa} & \quad \{ \text{linda (beautiful)}, \text{divina (divine)} \} \\
\text{(He dances)} & \quad \{ \text{delicada (delicate)}, \text{ligeira (light)}, \text{lenta (slow)}, \text{vigorosa (vigorous)} \} \quad (\pm \text{mente}) \\
\end{align*}
\]

In the case where the two forms are possible,

\[
A \text{ doente olhou-me } \quad \{ \text{triste (sad)}, \text{timida (shy)}, \text{ansiosa (anxious)} \} \quad (\pm \text{mente})
\]

it is assumed that the two structures have a different origin: a) the form with *mente* is the result of an Adverbialization, b) the adjectival form comes from an epithetic movement. These would postulate two deep structures:

(1)

(2)
This solution seems to be counter-intuitive, but it explains noun-adjective agreement.

6. Portuguese Pronominalization

Following the treatment of the adverb, the phenomenon of pronominalization can be accounted for by a cyclic transformational rule, which is tentatively written now.

Pronominalization (obligatory)

\[ \text{SC} \quad \text{pro} \quad \text{MERGEF} \quad 9 \]

Cond: \[ 4 \text{ EQ 10} / 10 \text{ EQ 14} \]

The adverb \textit{quando} (when), as illustrated in the preceding examples, has the following deep structure.

\textit{Quando o Jorge foi ao exame, não sabia nada.}

(When George went to the examination, he did not know anything.)
The first transformation is Adverbialization, which is optional due to the feature \(|+_\text{adv}|\) of \textit{quando}. If the adverbialization transformation is not applied, the feature \(+\text{adv}|\) can be obtained by Pronominalization of the sentence.  

1) \textit{Quando foi ao exame, o Jorge não sabia nada.}  
(When he went to the examination, George did not know anything.)

Pronominalization accounts for sentence (2) \textit{Quando foi ao exame o Jorge não sabia nada} (When he went to the examination, George did not know anything). If the optional adverb anteposition transformation applies, structure (3) is derived.

3) \textit{O Jorge não sabia nada quando foi ao exame.}  
(George did not know anything when he went to the examination.)
The same order of transformations allows for the derivation of Lakoff's example.

\[ A \text{ Maria viu um elefante perto dela.} \]
\[ (\text{Mary saw an elephant close to her.}) \]

This sentence has the same deep structure.

The only difference is that Adverbialization is obligatory in order to account for \(\text{c\'erca de}\) (near), which carries the feature \(|+\text{adv}|\). The following structure,
derives sentence (1) by Pronominalization,

1) A María viu um elefante cerca dela
   (Mary saw an elephant near her),

and sentence (2) by anteposition of adverb,

2) Cerca dela a María viu um elefante
   (Near her Mary saw an elephant).

In conclusion, the phenomenon of Adverbialization does not interfere in the formalization of the Pronominalization cyclic rule. The same thing could be said for the phenomena of Topicalization and cleft sentences.

The following sentences illustrate Topicalization:

3) Quando comprou o José, o carro, que tem?
   (When did Joseph buy his car?)

4) O carro que tem, quando o comprou o José?
   (The car that Joseph has, when did he buy it?)

If in this analysis, Topicalization is applied at the second cycle before Pronominalization, the following structure is derived:
In the sentence,

\[ O \text{ carro que tem o José, quando o comprou? } \]
(The car that Joseph has, when did he buy it?),

Pronominalization cannot be applied to the extraposed NP at the end of the cycle. But if at the second cycle, Topicalization, which is optional, does not apply, then the Pronominalization transformation is applied to the following deep structure:
The solution proposed here is a simplified version of Ross's (1969) proposal. Only Forward Pronominalization takes place. The Pronominalization transformation requires two embedded propositions at the same level. The structure should be of the type NP/<P/<NP>>. The only criterion for Pronominalization is the order of the subject and predicate constituents.

1) O professor que dá lições à aluna está convencido de que o filho se casará com ela.
(The teacher who gives lessons to the student is convinced that his son will marry her.)

2) Está convencido de que o filho se casará com a aluna o professor que lhe dá lições.
(He is convinced that the son will marry the student, the teacher that gives her lessons.)

```
```

```
```

```
```

```
```
To account for this example a second Pronominalization transformation will apply after the post-cyclic transformations. It will determine the surface order of the elements in the sentence.

B. Reflexivization

The phenomenon of Reflexivization is based on the occurrence of "co-referentiality" or identity of some sort between NP's. In postulating a class of "True Reflexives," the following rule will derive the true reflexive sentences.

**Reflexivization (obligatory)**

<table>
<thead>
<tr>
<th>SD</th>
<th>P&lt;F&lt;% NP&lt;Z %&gt;%&gt;NP&lt;Z %&gt;%</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC</td>
<td>+ Refl</td>
</tr>
<tr>
<td>Cond</td>
<td>4 EQ 8</td>
</tr>
</tbody>
</table>

1) *O João barbeou-se.*
   (John shaved (himself))

```
         P
        /|
       / |
      F   NP
     /    |
    Z     NP
   /       |
  Det     Det
 /    |    |   |
Z  Z  Z  Z
    |    |
  o  João
```

```
Another class of reflexives is the so-called "impersonal sentences." This class of reflexives is subdivided in three groups:

1. Reflexive-Passives

   *Louvam-se os deuses.*
   (The Gods are worshipped.)

   *Previnem-se as pessoas presentes.*
   (The people present are advised.)

   *Difundem-se as notícias pela rádio.*
   (The news is broadcast by the radio.)

These sentences are accounted for by the Reflexivization transformation. The form *pela* is not the result of a Passivization, but is a predicate.

2. Impersonals

   *Louva-se aos deuses.*
   (The Gods are worshipped.)

   *Previene-se as pessoas presentes.*
   (The people present are advised.)

   *Difunde-se notícias pela rádio.*
   (The news is broadcast by the radio.)

   *Em Lisboa passeia-se muito.*
   (In Lisbon people walk a lot.)

   *Precisa-se de dactilógrafas.*
   (Typists are needed.)

   *Vende-se discos.*
   (Records are sold.)

This type of sentence formation is the "True Impersonal" derived by the following transformation.
Impersonalization (obligatory)

SD P<F<% NP<Z %>%>NP<Z>> 1 2 3 4 5 6 7 8 9

SC |+ Refl| MERGEF 9

Cond 9 INCL | - def | & 5 NINCL | - 2 pers | + refl |

This grammar does generate the sentences,

*Precisam-se de dactilógrafas.*

*Vendem-se discos,* although, in my judgement, they are agrammatical. If these sentences are to be accepted as grammatical, a rule of permutation between the subject and the complement accounts for their description. This analysis is not recommended, however.

The postulation of these two transformations allows also for the desambiguation of sentences of the type (1) and (2).

1) *A espingarda desmontou-se.*
   (The rifle is dismantled - by someone.)
   (The rifle is dismantled - by itself.)

2) *A sobremesa desfez-se.*
   (The dessert is diluted - by someone.)
   (The dessert is diluted - by itself.)

These sentences have two different deep structures (A) and (B).

(A)  
   \[ \begin{array}{c}
   F \\
   \text{NP} \\
   \text{Z} \\
   \text{desfaz} \\
   \text{sobremesa}
   \end{array} \]

(B)  
   \[ \begin{array}{c}
   F \\
   \text{NP} \\
   \text{Z} \\
   \text{desfaz} \\
   \text{sobremesa}
   \end{array} \]

\[ \text{---} \]

1 *Precisam-se dactilógrafas* - a passive construction.

*Precisa-se de dactilógrafas* - an impersonal construction.
The deep structure of (A) is accounted by Reflexivization and (B) Impersonalization. Both deep structures have the same surface realization.

3. Automatic Reflexives

This class comprises the obligatory reflexive verbs which have the inherent feature |+ V refl| in the lexical representation. These verbs have their counterparts which do not carry the inherent feature |+ V refl|. This transformation is then reformulated.

Reflexivization I (obligatory)

<table>
<thead>
<tr>
<th>SD</th>
<th>P&lt;F&lt;Z % (NP&lt;S %&gt;) %&gt;NP&lt;Z %&gt;&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2 3 4 5 6 7 8 9 10 11</td>
</tr>
</tbody>
</table>

| SC | 9 SUBST 5, |+ V refl| ERASEF 3 |
|----|---------------------------------|
| Cond | 3 INCL |+ V refl| |
| SC | |+ refl| MERGEF 6, ERASE 7 |
| Cond | 9 EQ 5 |

This transformation now accounts for the verbs with dual behaviour, when carrying the |+ V refl| inherent feature.

1) A Isabel lamentou-se do acidente.
   (Isabel regretted the accident.)

2) A criada sumiu-se.
   (The maid disappeared.)

3) A Isabel lamentou o acidente.
   (Isabel regretted the accident.)

4) A criada sumiu o dinheiro.
   (The maid made the money disappear.)

In this proposal the presence of the reflexives in sentences containing the so-called "automatic reflexive verbs" is accounted for by marking
the verb as undergoing the copying of the subject formation rule, as
in sentences (1) and (2), the case of *lamentar-se* (complain), and *sumir-se* (disappear), etc. When sentences containing these verbs have a complement sentence embedded in them, Reflexivization requires the presence of an identical NP in the lower sentence. The absence of reflexive verbs requires the deletion of the second part (copying) of the subject formation rule, as in sentences (3) and (4), the case of *lamentar* (regret), and *sumir* (to make disappear).

Automatic reflexive verbs will then be treated as always taking an underlying complement; the presence of the reflexive is to be explained in terms of the normal application of Subject Raising and Reflexivization. The application of this transformation is not limited exclusively to the surface verbs. The same transformation is applied to the derivation of reflexives where the surface predicate belongs to other traditional categories.

1) O patrão está fora de si/dela.
   (The boss is outraged.)

2) A enfermeira está segura de si/dela.
   (The nurse is sure of herself.)

The aspectual reflexives are not strictly syntactic, as in the following sentences:

1) A mãe morre de tristeza
   (The mother is dying of sadness),

2) A mãe morre-se de tristeza
   (The mother is dying of sadness),

3) O soldado foi para a guerra
   (The soldier went to the war),

4) O soldado foi-se para a guerra
   (The soldier went to the war).
The only possible solution is to give special lexical entries to the forms *morrer-se* (to die), and *ir-se* (to go away), carrying the feature |+ V refl|, independently of the other forms *morrer* (to die), and *ir* (to go). The feature |+ V refl| requires the transformation to make a subject copying in the direct complement position. Thus, (B) would be obtained by the first operation of Reflexivization, (A).

(A)   (B)

The structure (B) may undergo the Reflexivization transformation to produce the correct surface structure.

All the "True Reflexive Verbs" or "Obligatory Reflexive Verbs," such as *atrever-se* (dare), *esquecer-se* (forget) *arrepender-se* (repent), and the like, also carry the feature |+ V refl|.

C. **Relativization**

The relative structures result from two different transformations. The first transformation carries out three important operations: adjunction of the feature |+ qu|, extraposition of the relativized NP, and Equi-NP
deletion. The second transformation presupposes the constituent of the relation that has the relativized NP. The postulation of these two transformations is warranted because the relativized constituent is not the same as the one preposed. These transformations are applied to two different Phrase-Markers.

Relativization (obligatory)

\[
SD \quad % \text{NP}<F % <\text{NP}<Z % >> % \\
1 2 3 4 5 6 7 8
\]

\[
SC \quad | + \text{qu} | \text{MERGEF 6, 5 ADFID 2, ERASE 7}
\]

Cond 4 NEQ NP & 4 NEQ F<F<P>

Relativization works on the following structure.

\[
O \text{ rapaz tem uma flauta que toca.} \\
(\text{The boy has a flute that is working.})
\]
The NP constituent that takes the feature $|+\text{ que}|$ may be any NP except the two types mentioned by Ross (1969). These are the NP's affected by the "universal constraint," the complex NP's, and the coordinated NP's. Therefore, the relative sentences (1), (2) and (3) may be derived from the following structure (A).

(A) O visitante deu a esmola ao ceguinho.
(The visitor gave the donation to the blind beggar.)

1) O visitante que deu a esmola ao ceguinho.
(The visitor who gave the donation to the blind beggar.)

2) A esmola que deu o visitante ao ceguinho.
(The donation which the visitor gave to the blind beggar.)

3) O ceguinho a quem o visitante deu a esmola.
(The blind beggar to whom the visitor gave the donation.)

The level of embedding is not important as demonstrated in the following tree diagram.
Sentences (4), (5), (6) and (7) may be derived from the (B) structure.

**Extraposition of NP₁**

4) O visitante do escritório da companhia dos diamantes que deu . . .
(*The visitor from the office of the diamond company who gave . . .*)

**Extraposition of NP₂**

5) O escritório da companhia dos diamantes o visitante da qual deu . . .
(*The office of the diamond company the visitor of which gave . . .*)
Extraposition of NP

6) *A companhia dos diamantes o visitante do escritório que deu . . .
   (The diamond company the office visitor who gave . . .)

Extraposition of NP

7) *Dos diamantes o visitante do escritório da companhia que deu . . .
   (The diamonds the visitor from the office of the company who gave . . .)

Some of these sentences are awkward possibly because they do not conform to our constraints of perception (Bever, 1970). In a description of performance these sentences would have to be constrained, i.e. blocked.

The phenomenon of Relativization does not present limitations in the number of propositions. Thus, sentence (2) can be derived from sentence (1).

1) A Maria imagina que a irmã sabe que a Luisa dá um baile.
   (Mary imagines that her sister knows that Louisa is giving a dance.)

2) Será um êxito o baile que a Maria imagina que a irmã sabe que a Luisa dá.
   (The dance which Mary thinks that her sister knows that Louisa is giving will be a success.)

The structure of the type NP<NP %> is the only one that derives agrammatical sentences. The structure (X) cannot generate structure (Y).
This grammar cannot generate sentences such as:

1) * A rá que canta que vive no lago (tem uma amiga no rio)
   (The frog who sings who lives in the lake (has a friend in the river)).

Some speakers may accept this sentence as grammatical.
Some speakers accept sentence (1) as a grammatical sentence. It is an example of the so-called "stacked relatives" phenomena described by the traditional grammarians. In order to generate sentences of this type the grammar must include a tree pruning operation. The pruning must be carried out in such way that structure (b) can be derived from structure (a).

The embedded NP would comply with the structural description of the Relativization transformation. In this way the structure (d) could be derived from (c)
In this grammar "stacked relatives" are considered agrammatical and are not therefore generated.

Another constraint results from the impossibility of relativizing the constituent NP's of adverbial propositions of the type F<F<P<% NP %>>. From the following sentences (1) and (2), the sentences (1') and (2') could not be derived.

1) *A estudante desatou a chorar quando soube que tinha chumbado o exame.*  
   (The student started to cry when she learned that she had failed the examination.)

2) *O fugitivo estava cansado depois de guiar toda a noite.*  
   (The fugitive was tired after driving all night.)

1') *O exame que quando soube que tinha chumbado a estudante desatou a chorar.*  
   (*The examination that when she learned that had failed the student started to cry.)

2') *A noite depois de guiar toda a qual o fugitivo estava cansado.*  
   (*The night after driving all which the fugitive was tired.*)
These agrammatical structures are excluded by the condition $4 \text{ NEQ } F<F< P>>$.

This treatment of extraposition operations in the Relativization Transformation is postulated and justified in order to prevent the generation of sterile deep structures resulting from analysis based on the co-occurrence of Equi NP's in a structure such as:

\[
\begin{array}{c}
\text{NP} \\
\text{NP} \\
\% \quad \text{P} \quad \% \\
\%
\end{array}
\]

This treatment is the basis for most of the transformational analysis of relatives.

In the formation of the precedent element from the anaphoric element the possibility of relativizing structures with different determiners is avoided. This grammar blocks the Relativization of generated structures such as:

1) \textit{As amendoeiras (a amendoeira está em flor) embelecem o Algarve} \\
(The almond-trees (the almond-tree is in bloom) beautify Algarve).
1. Anteposition of [+ qu]

The anteposition of the feature [+ qu] places initially in a sentence every element carrying the distinctive syntactic feature. This syntactic property has several sources, as already discussed in relation to Interrogation, Relativization, Cleft sentences and Exclamation. They would include, for example:

1) *Que lindo!*  
   (How beautiful!)

2) *Que pena!*  
   (What a pity!)

3) *Que horror!*  
   (How horrible!)

To account then for such phenomena the following transformation is pos-
tulated.
Anteposition [+ qu] I Transformation (obligatory)

SD \( P<\text{F<}\%/<\text{Z}>\text{NP}/<\text{Z}>> \)
\[
1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6
\]

SC 5 AFIDE 1
Cond 6 INCL [+ qu]

SC 3 AFIDE 1
Cond 4 INCL [+ qu] & P NDOM 4

This transformation assures the anteposition of any constituent carrying the feature [+ qu], with a preference for the subject in relation to the other. There are three constraints on this transformation.

The transformation can only apply once in the same proposition, preventing in this way the derivation of agrammatical forms. If in the same proposition the presence of two constituents carrying the feature [+ qu] occurs, then the grammar would generate such structures as (1) and (3) but not (2).

1) \textit{Quem telefonou a quem?}  
   (Who telephoned who?)

2) *\textit{Quem a quem telefonou?}  
   (* Who who telephoned?)

3) \textit{A quem quem telefonou?}  
   (Who telephoned who?)

Generally the anteposition of the constituent with the feature [+ qu] is within its proposition. There is, however, an important class of exceptions to this generalization, namely the verbs that require embedded propositions as complements. In this case, the element carrying the feature [+ qu] is placed at the beginning of the proposition which has that class of verb. Then in the following example, when embedding the
interrogative proposition (1) in a matrix verb such as esperar, (2) is obtained.

1) Quando termina a tese a Conceição? 
   (When does Conceição finish her dissertation?)

2) Quando espera terminar a tese a Conceição? 
   (When does Conceição expect to finish her dissertation?)

Not all the operator verbs have this property. The sentence (3) with a verb such as perguntar, could not be derived from (1). Only an analogous structure (4) could be derived from (1).

3) * Quando perguntou o professor que termina a tese a Conceição 
   (* When inquired the professor that Conceição finish the dissertation.)

4) O professor perguntou quando termina a tese a Conceição 
   (The professor inquired that Conceição finish the dissertation.)

The first constraint is to antepose an element of an embedded proposition and is valid for any occurrence of |+ qu|.

To illustrate this property the examples of the interrogative were given, but the same phenomenon occurs in relatives and cleft sentences.

Cleft

1) É ao António a quem não se faz o ninho atrás da orelha. 
   (Anthony is the one who cannot be fooled.)

Relative

2) Os alunos do segundo ano que costumam fazer pouco dos caloiros. 
   (The second year students that use to make fun of the freshman.)
The second constraint allows for a certain number of predicates to carry the feature |+ antqu|, which require a supplementary transformation, called Anteposition |+ qu| II Transformation, post-cyclic and that derives the appropriate forms.

The third constraint imposed on the Anteposition |+ qu| I transformation explains the need to distinguish it from the Relativization operation.

The element receiving the feature |+ qu| by Relativization is the determinative of the NP, NP<Z %>, but considering the Anteposition operation we remark that the anteposed constituent is not the determinative nor its dominating NP, but it is the constituent of immediate relation. This phenomenon has been treated by Ross (1967) who proposed the "Pied Piper Convention." We have demonstrated that if in a theory the relative is extraposed from the antecedent by copying the relativized NP, Ross's deep analysis is faulty. Even in the case of adopting the analysis based on the co-occurrence of two identical NP's, Ross's analysis does not describe adequately the facts involved in anteposition.

In the example:

1) Em casos de emergência o Governo prescreve a qualidade das balas das espingardas.
   (In emergencies the Government prescribes the quality of bullets for the rifles.)
If NP3 is relativized, the anteposed constituent is not only NP3, but the entire NP. In applying Relativization we would have:

2) As espingardas, a qualidade das balas das quais prescreve o governo em casos de emergência
   (In emergencies the Government prescribes the quality of the bullets for the rifles).

This surface form is correctly predicted by Ross's "Pied Piper Convention." This convention prescribes that the highest NP in the tree dominates the relativized element, which is extraposed. If we consider the case where NP5 dominates \+qu\, then it is not NP4 which is anteposed because it would derive the following agrammatical sentence:

3) * Emergência, casos da qual o governo prescreve a qualidade das balas das espingardas em
   (Emergency, in cases of which the government prescribes the quality of the bullets of the rifles.)
The constituent F4 must be anteposed to derive the correct grammatical sentence (4).

4) Emergência, em casos da qual o governo prescreve a qualidade das balas das espingardas.
   (Emergency, in cases of which the government prescribes the quality of the bullets of the rifles.)

Ross's "Pied Piper Convention" works better for English and derives the correct type of relative.

1) The knife which he cut the bread with.
2) The house they found the boy near.

However, Ross may err in proposing a contribution to the typology of languages. His constraint does not apply to Portuguese where these facts are explained by a transformation, accounting in its structure description for the relation of the constituents.

2. The Genitive

In relation to the relatives a treatment of the associated structure of the genitive is proposed here. The deletion is required of the preposition de (of), which can be replaced by a different form in case of Pronominalization of Relativization. In case of Relativization this phenomenon can be illustrated as follows.

```
vestido
+ qu
vestido
```
1) *O vestido do qual cujo vestido
(The dress of which) (whose dress)

The following transformation realizes this derivation.

Genitive (optional)

SD  \%<(Z) NP<Z>\%
1 2 3 4 5

SC  * plur\ MOVEF 2 4, \+ gen\ MERGEF 4, ERASE 2
\+ de\ ERASEF 4

Cond 4 INCL \+ qu\, & 2 EQ de

The same transformation derives the possessives:

2) O disco dele o seu disco
(The record of him) (his record).

In this case we need a supplementary condition:

Cond 4 INCL \+ def\]

This obligatory condition is applied to the first person singular and to the second person singular \+ 2 pers \- você\.

3) * O vestido é de mim.
(The dress is mine.)

4) * A irmã de ti.
(Your sister.)

3') O vestido é meu.
(The dress is mine.)

4') A tua irmã.
(Your sister.)

While for cujo the anteposition is obligatory, it is optional for the possessives.

5) O seu disco.
(His record.)
6) *o disco seu*.

(His record.)

This anteposition is accounted for by the Adjectivization Transformation previously discussed. The feature |+ qu| is always anteposed in case of the interrogatives. The possessives have an inherent feature |+ antep| by a Redundancy rule.

D. **EQUI-NP Deletion**

Pronominalization consists essentially of two operations. The first involves the adjunction of certain features that provide the correct substitute form, such as: Reflexivization and Relativization. The second includes the deletion of the duplicated predicate. This deletion is the operation which marks the syntactic feature |+ pro|. The Pronominalization Transformation is then reformulated to integrate the second operation.

\[
\text{Pronominalization (obligatory)}
\]

\[
\text{SD} \quad \text{P} / (<\text{NP}<Z \ F \ %>) \quad % \text{P} / (<\text{NP}<Z \ F \ %>) (\text{NP}<Z \ F \ %>)
\]

1  2  3  4  5  6  7  8  9  10  11  12  14  15

13

\[
\text{SC} \quad |+ \text{pro}| \quad \text{MERGEF 9, ERASE 10}
\]

\[
\text{Cond} \quad 4 \text{ EQ} 10 / 10 \text{ EQ} 14
\]

The deletion operation is connected with other series of operations, proposed previously, to account for the deletions of the surface pronouns (Langacker, 1966:281; and UESP, 1969:494).

In view of the similarity of the several deletions concerning Reflexivization and Relativization, most grammars treat these transformations as two variants of the Pronominalization Transformation.
This grammar distinguishes these two transformations on a basis of the different nature of the performed deletion.

The operation deletion in Pronominalization allows for the deletion of several identical constituents, regardless of their surface categorial realizations.

1) Quando o João comprou um jaguar, com rádio e gravador,
   (When John bought a Jaguar, with radio and tape deck,

   o José comprou { um mais velho (an older model) 
   (Joseph bought { um do ano passado (a last year's model) 
       um Morgan (a Morgan) 
       um igual (an identical one) 
   aquele (that one).

   etc...}

The entity to be deleted is neither the noun nor the entire NP, but each constituent F of the NP. The transformations of Adjectivization, Relativization and Nominalization interfere in the formation of the NP. This NP constituent acquires a stable form such as:

```
NP
    Z
   / \  /
  /   \ /   \ 
 /     /     / 
{F}   {F}  etc.
```

The successive applications of the Pronominalization transformation allows for the derivation of all types of NP's, regardless of the nature of the determinant, which is not affected by the transformation. Therefore, deletions can take place even though there are apparent differences in the NP's.
1) *Dentre os fadistas célebres há um que se destaca dos outros.*

(Among the famous fado singers there is one outstanding.)

In the case of the deletions concerning the transformations of Reflexivization and Relativization, the deleted constituent is not the first F after the determinant, but the whole NP, except the determinant. It is possible to retain neither one nor several of the attributes once the noun is deleted, nor the noun with only some attributes. Therefore, sentence (2) cannot be derived from (1) by Relativization, but sentence (3) can.

1) *As serenatas de Coimbra põem-me doida.*

(The Coimbra serenades please me.)

2) *As serenatas que Coimbra põem-me doida.*

(*That serenades the Coimbra please me.)

3) *As serenatas de Coimbra que me põem doida.*

(The Coimbra serenades please me.)

In the same way as by Reflexivization, sentence (5) cannot be derived from sentence (4), but only from sentence (6).

4) *O gato preto lambeu o gato preto.*

(The black cat licked the black cat.)

5) *O gato lambeu-se preto.*

(*The cat licked himself black.)

6) *O gato preto lambeu-se.*

(The black cat licked himself.)

The language has, however, sentences which are similar to sentences (2) and (5), as for example:

7) *Lembro-me dele, o qual, desgraçado, pôs-se a emborrachar-se.*

(I remember him, who, unfortunately, started to get drunk),
8) *A minha irmã casou-se jovem*  
(My sister got married young).

This type of structure could be explained by transfer of the epithet from bottom up in a diagram tree. Then sentence (9), although counterintuitive, would be the result of sentence (7).

9) *Lembro-me do desgraçado, o qual pôs-se a emborrachar-se.*  
(I remember the unfortunate, who started to get drunk.)

However, sentence (8) could not derive sentence (10), nor could it be a case of Adverbialization.

10) *A minha irmã jovem casou-se.*  
(My young sister got married.)

This sentence is a case of agreement like the sentence:

1) *Pintou o salão branco*  
(He painted the livingroom white).

This sentence is ambiguous because the analysis does not consider *branco* as an epithet of *salão*. In this case such an analysis would have the following phrase-marker:
2) *A cerveja bebe-se fria.*
(Beer is drunk cold.)

And the following structures are agrammatical in Portuguese:

1') *Pintou o salão branco*  
(He painted the livingroom white),

2') *A cerveja bebe-se frio*  
(Beer is drunk cold).

In these cases the modification of the Deletion operating only on F and not on the noun-phrase, has the function to eliminate agrammatical structures.

II. THE ORDERING OF THE TRANSFORMATIONAL CYCLE

The mechanism of the grammar in this thesis contains the notion of transformational cycle. The proposed processes for the operational cycle differs from that found in current transformational grammars.
A. Recursiveness

Cyclic recursiveness is a system that introduces the boundaries of the proposition in the first rule which defines the minimal form of the sentence or proposition. In Querido et al., 1969:1) the first base rule is

\[ P \rightarrow \# (\text{PRE}) \text{ SN PRED \#} \]

This type of rule is insufficient because it excludes the constituent P of the structural description of any sentence. This is a faulty omission if the presence of P is considered essential to the realization of certain transformations. In the case of Topicalization, where this transformation extraposes a constituent of P to join it to the left of P, the structural description of this transformation is valid for Portuguese. Then from the structure (1), (2) is derived.

1) \textit{O toureiro chegou.}  
\hspace{1cm} (The bullfighter arrived.)

2) \textit{O toureiro, chegou.}  
\hspace{1cm} (The bullfighter, he has arrived.)

\begin{align*}
1) \hspace{1cm} 2) \\
\text{Topicalization} \\
F & \qquad \text{NP} \\
\text{P} & \rightarrow \quad \text{Topicalization} \\
\text{NP} & \qquad \text{NP} \\
\text{P} & \rightarrow \quad \text{Topicalization} \\
F & \qquad \text{NP}
\end{align*}

With Querido's type of base rule this transformation is impossible. Therefore, (Y) could not be derived from the structure (X),
because it goes beyond the boundaries of the structural description of the transformation which does not comprise P. It is also inadequate because a P has to be created for which there are no boundaries. Therefore, it cannot be the object of another transformational cycle which is necessary for the realization of Pronominalization and other operations involved in the determination of the grammatical form of the embedded proposition. The type of grammar that places P in the structural description of the transformations by the following first rule,

\[
\text{# P } \rightarrow \left\{ \begin{array}{c}
\text{# P Coord # P #} \\
\text{AVP Pro Nucleu,}
\end{array} \right\}
\]

is found in Vasiliu and Golopentia-Eretescu (1969:317). This rule, however, does not entirely solve all the problems. It does not always give structures that can undergo the operation of Topicalization because any adjunction would have the dominant P without boundaries. Also, the repetition of symbols for the boundaries of each recursive rule of P and the need for a first contextual rule are pragmatically clumsy.

My proposal for boundary insertion is to treat P exclusively as a base constituent. It is defined by a first rule which prescribes its
boundaries. This rule is designated by the symbol of number one. The introduction of this boundary rule requires a new modified base rule.

**Base Rules**

1. \( S \rightarrow \# P \# \)
2. \( P \rightarrow F (NP, S) \)
3. \( F \rightarrow Z [(NP, S)(NP)] \)
4. \( NP \rightarrow (Z, S) \)

Any derivation will have a deep structure of the general form of (A). Transformations such as Topicalization, which needs the presence of a constituent P in its structural description, are realized without going beyond the boundaries of the proposition, as in (B).

(A) \hspace{2cm} (B)

![Tree diagrams](image)

This superstructure (\(# S \#\)) is inserted by each transformation. The presence of the symbols '\# \#' is not needed for the transformation operations.
B. The Ordering of Cyclic Rules

The definitive order of the cyclic rules proposed here is shown in Appendix A.

Arguments have already been presented that transformations such as Topicalization, Cleft, Adverbialization, and Relativization must precede Pronominalization. Other transformations were already proposed to justify the preferential order Adjectivization-Nominalization-Relativization in the formation of a Noun-Phrase.

The order of transformations must be based on generalized principles to determine the position of a given transformation in the cycle. Given a series of transformations with the same structural description, there can only be one first obligatory transformation; the others follow in the cycle. Another principle is based on the fact of opposition among the transformations $(T)$, which are characterized by a structural description of the type PP and $(T')$. Their structural description does not go beyond one proposition. The first $(T)$ must precede the second $(T')$, although the applying order is in a contrary direction. The procedure requires that the first application in the cycle, on a structure with boundaries # P #, must precede the rule with the widest domain.

Finally, simplicity excludes from the cycle any movement transformation which affects a certain fixed order of constituents prescribed by the base rules. Every transformation of this category which is not needed for the derivation of a cyclic transformation, is placed as a post-cyclic transformation.
C. Post-Cyclic Transformations

Post-cyclic transformations are of two categories. The first comprises the transformations which realize a change in the surface order of the constituents, such as: Anteposition Adverb, Anteposition + qu, Anteposition Adjective and Anteposition Subject. The second category includes the transformations which realize in surface constituents the elements that have appeared in the previous derivations as features, or that have carried in the deep structure an element which is not marked in surface structure. Such transformations are the adjunction transformation of prepositional features, the Não-Adjunction, deletion transformations such as the deletion que for the formation of some interrogatives like quando, como, etc., and the determiner deletion for the formation of some proper nouns without epithets such as city names.

Post-cyclic transformations have the common characteristic of not performing movements or changes of an interpropositional nature. These transformations apply in a strict order, often operating in successive blocks. The movement transformations generally precede the adjunction or deletion transformations. In some cases the two types of operation co-exist in the same transformation. This type of operation is demonstrated by a fragment of the grammar, the clitic pronouns.

1. The Clitic Pronouns

The cyclic rules of Pronominalization and Reflexivization derive anaphoric structures. These rules produce the type of structures illustrated in the following derivations.
In the case of Pronominalization, where the deletion is successively realized by each embedded F in the NP, allowing for the partial deletion of only one NP in case of non-equivalency among the constituents, the following surface grammatical form is derived, as illustrated by the example:

1) Quando a Maria comprou a mini-saia azul, (eu) comprei a branca
(When Mary bought the blue mini-skirt, I bought the white (one)).
When there is not a different epithet between the antecedent and the anaphora, and when the determiner carries the Referential feature [+ def], the characteristic form of the anaphoric is the pronoun called "clitic," which is characterized by its non-accentuated phonological form and its distinctive position in relation to the verbal predicate. Then, in case of an unique determiner anaphoric carrying the feature [+ neg] there is anteposition, as illustrated in the following examples.

1) Comprei a branca
   a) Comprei-a
   b) Não a comprei

2) Prometo a criança
   a) Prometo-lhe
   b) Não lhe prometo

This anteposition of clitics is not too different from the other anteposition operations like the adverb or the feature [+ qu]. The following transformation is proposed for the clitics.

**Anteposition of Clitics (post cyclic) obligatory**

```
SD    P %F<Z % NP<Z>%>%%  
1 2 3 4 5 6 7 8 9 10 11
SC    7 AFIDE 3
Cond  8 NINCL ([+ 1 pers], [+ 2 pers], [+ refl]) & 8 INCL [+ neg]
SC    7 AFIDE 3
Cond  8 NINCL ([+ 2 pers], [+ refl]) & 8 INCL [+ neg]
SC    7 AFIDE 3
Cond  8 NINCL [+ refl] & 8 INCL [+ neg]
SC    7 AFIDE 3
Cond  8 INCL [+ neg]
```

This transformation applies successively to account for all the structures derived from its structural description.
III. COORDINATION

This section analyzes the description, specification and justification of the transformations involved in the conjunction phenomenon.

In Syntactic Structures, Chomsky accounts for all conjoined structures by means of only one deletion transformation applied to conjoined propositions (generalized transformation). In Chomsky, 1957:113,

"Conjunction

Structural analysis: of S1: Z - X - W
of S2: Z - X - W
where X is a minimal element
(eg., NP, VP, etc.) and Z, W
are segments of terminal strings.

Structural change: (X1 - X2 - X3; X4 - X5 - X6) →
→ X1 - X2 + and + X5 - X3."

In the grammar presented in this thesis, the equivalent would be

1 2 3 4 5 6 → 1 2 + e + 5 3.

Such a rule would derive the conjoined (2) from structure (1).

1) O Manuel compra uma vivenda, a Maria compra uma vivenda.
   (Manuel buys a villa and Mary buys a villa.)

1') O Manuel e a Maria compram uma vivenda.
   (Manuel and Mary buy a villa.)

2) O velhote corre, o velhote grita por socorro.
   (The old man runs and cries for help.)

2') O velhote corre e grita por socorro.
   (The old man runs and cries for help.)

Manuel oompra uma vivenda, a Maria oompra uma vivenda. • -
(Manuel buys a villa and Mary buys a villa.)
3) O ferro-velho compra frascos e o ferro-velho vende frascos.
(The junk-man buys old bottles and sells old bottles.)

3') O ferro-velho compra e vende frascos.
(The junk-man buys and sells old bottles.)

This rule would not allow the derivation of the agrammatical structure (4') from (4).

4) O homem compra gelados e a mulher vende gelados na praia
(The man buys ice-cream and the woman sells ice-cream on the beach)

4') O homem compra e a mulher vende gelados na praia
(The man buys and the woman sells ice-cream on the beach)

because Chomsky's base rules do not analyze the forms o homem compra and a mulher vende as constituents.

Chomsky's analysis has predominated in most of the subsequent transformational treatments of conjunction. Gleitman (1965), Schane (1966), UESP (1969) and Dougherty (1970), have concluded that it would account for any conjoined structure.

In a series of articles, Smith (1965), Gleitman (1965), Lakoff and Peters (1966), McCawley (1968) and others, present examples to demonstrate the impossibility of deriving the conjoined constituents from conjoined propositions. Their arguments can be divided into three groups.

The first is that we cannot have two conjoined sentences of the type (2).

1) Três e quatro são sete.
(Three and four makes seven.)

2) Três são sete e quatro são sete.
(Three makes seven and four makes seven.)
3) A Helena e o Carlos compraram o último disco da Amália Rodrigues.
(Helen and Charles bought the latest record of Amália Rodrigues.)

Sentence (3) is ambiguous because it does not specify how many records were bought. If the deep structure shows semantic differences, the grammar must provide two syntactic descriptions of this sentence. But according to Chomsky's rule, there is only one source of conjoining, which causes some problems.

The second objection is that the type of sentences that include a special class of predicates, namely, those that do not accept a singular subject, cannot be derived.

1) O Manuel e a Maria fazem um par simpático.
   (Manuel and Maria make a nice couple.)

2) O oxigénio e o hidrogénio misturam-se para formar água.
   (Oxygen and hydrogen mix to form water.)

3) Tu e eu vamos jantar fora.
   (You and I are going out for dinner.)

Intuitively, the following deep structure for sentence (1) is (1').

1') O Manuel faz um par simpático e a Maria faz um par simpático.
   (Manuel makes a nice couple and Maria makes a nice couple.)

Langendoen (1966) presents some predicates that are logically symmetrical from a syntactic point of view.

1) O António parece-se muito com o irmão.
   (Antonio looks like his brother.)

1') O António e o irmão parecem-se muito
   (Antonio and his brother look alike.)

2) O Miguel casa-se com a Aparecida.
   (Michael marries Aparecida.)

---

3 This sentence could, however, be derived from "Tu vais," and Eu vou."

4 This sentence is not intuitively the source of (1).
2') O Miguel e a Aparecida casam-se.
   (Michael and Aparecida get married.)

As proposed by Langendoen and Lakoff, these cases are treated by a con­
joined transformation.

The third group comprises the predicates which show a form of
conjoined structures.

1) Leva um vestido preto e branco.
   (She is wearing a black and white dress.)

There is no syntactic explanation for this type of predicate. Forms such
as preto e branco (black and white), muitas e muitas vezes (many and many
times), and aqui e acolá (here and there), must be treated as lexical
units, which due to their semantic cohesion, cannot be considered as
resulting from syntactic process.

From these three types of cases it is evident that there is more
than one origin of coordination. Dougherty (1967) wants to demonstrate
the intuitive relation between conjoined nominals and plurals, and to
account for some of their common syntactic properties using quantifiers,
or adverbs such as respectivo (respectively).

1) O João, o José e o Carlos regressaram todos á
   universidade.
   (John, Joseph and Charles, they all have returned
to university.)

2) Os moços regressaram todos á cidade.
   (The young boys, they all have returned to the city.)

3) O Pedro e o João beijaram respectivamente
   a Maria e a Amélia.
   (Peter and John kissed respectively Maria and
   Amelia.)

4) Os maridos beijaram as suas respectivas esposas.
   (The husbands kissed their respective wives.)
The structure using the reflexives in Portuguese can also be added to these properties.

1) O João e o Antônio encontraram-se na rua.
   (John and Anthony ran into each other on the street.)

A second argument is proposed by Dick (1968:78) based on the criterion of simplicity in sentences such as:

1) A Maria, a Antônia, a Luisa e a Josephina vendem batatas, repolhos, alfaces, ovos, galinhas e perus nas feiras e nos mercados, às terças e quintas-feiras
   (Mary, Antonia, Louisa and Josephine sell potatoes, cabbages, lettuces, eggs, chickens and turkeys at the fairs and markets on Tuesdays and Thursdays).

If this sentence were derived by Chomsky's conjoined rules, a great number of operations to account for its derivation would result.

The treatment of conjoined sentences proposed here differs from the traditional transformational treatments. The phenomenon of coordination is not based on a series of transformational operations applied to only one type of deep structure. It is based on a process restricted essentially to the base rules and different from any other syntactic processes outside of the predication. Some deletion operations are attached to base structure comprising conjoined propositions. Contrary to Chomsky, these transformations do not lead to conjoined constituents of the base; they constitute the phenomenon called "gapping" by Ross (1967).

Before presenting the nature of the Gapping Transformations we set up a classification on the basis of a surface structure of the different types of coordination defined by the base rules. A further version of the base rules is then:
The two major classes of coordination are "conjunctive" and "disjunctive," marked by the conjunctions e (and) and ou (or) respectively. Then three types of coordination can be formulated, according to the constituent which has a multiple expansion. A different type of coordination corresponds to each of the three base rules. Rule 1 allows the coordination of propositions (P → P^n). Rule 2 allows the coordination of predicates (F → F^n). Rule 3 allows the coordination of nominal phrases (NP → NP^n). For each of these types there are corresponding surface structures.

There is a parallelism between two classes of coordination. For each conjunctive coordination there is a possible disjunctive structure.

The "n" symbolizes an infinite number of that element.
- Coordination of Propositions \((P \rightarrow P^n)\)

1) Matrix Proposition \(P \rightarrow P^n\)

1.1 The neighbour works in a factory and his wife keeps the house.

2) Subject Proposition \(P \rightarrow F P\)

2.1 Auxiliary

- My neighbour must work and his wife keep the house.

2.2 Adverb

- There is a pilgrimage and the peasants have to rise early.

2.3 Prepositional group

- In the park, the children run, the dogs bark and there is a lot of activity.

2.4 Subordinated proposition

- When it's time for dinner, the maid will open the door for you and you may go in.

2.5 Verb

- I am pleased that you have come and that you will stay a few days with us.

3) Complement Proposition \(F \rightarrow Z P\)

3.1 Verb

- She prefers that Charles come and that he bring his friend.
b) Adjective

O cão está pronto a enfrentar o inimigo e a defender a casa.
(The dog is ready to stand up to the enemy and to guard the house.)

c) Noun

Mete-me medo a idéia de que os lobos estão sempre lá fora e que me vêm.
(The idea that the wolves are always out there and that they see me scares me.)

d) Subordination conjunction

Zangaram-se porque não pude visitá-los e disse-lhes tarde.
(They got angry because I could not visit them and told them too late.)

4) Relativized Proposition NP → P

Acabo de falar com muitas pessoas que veem de todas as partes do mundo e cujas idéias podem considerar-se como as mais elevadas.
(I have just finished talking to several persons who came from all parts of the world and whose thoughts can be considered as the most elevated.)

Aquele homem que vês ali e que dentro de uns momentos vai mergulhar é o irmão do campeão de natação.
(The man you see over there and that in a few minutes is going to dive is the brother of the swimming champion.)

- Coordination of Predicates (F → F^\text{i})

1) P → F .NP

a) Verb

A Alzira estuda e trabalha.
(Alzira studies and works.)

b) Adjective

Aquela rua é paralela à nossa e perpendicular à sua.
(That street is parallel to ours and perpendicular to yours.)
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c) Noun

O meu primo é chefe do departamento e director do programa.
(My cousin is head of the department and director of the program.)

2) P → F P

a) Adverb

Amanhã e o dia seguinte são feriados.
(Tomorrow and the next day are holidays.)

b) Prepositional group

A sombra e dentro de casa faz fresquinho.
(It is cool in the shade and inside the house.)

c) Subordinated Proposition

Sempre tomo dois comprimidos antes de almoxar e depois de jantar.
(I always take two pills before lunch and after dinner.)

d) Auxiliary verb

Posso e quero ir de férias.
(I can and I want to go on vacation.)

e) Verb

Estranha-me que ele esteja cá e que não venha visitar-me.
(It surprises me that he is here and that he is not coming to visit me.)

f) Adjective

É incrível que ensinem no mesmo departamento e que quase não se conheçam.
(It is incredible that they teach in the same department and that they hardly know each other.)

g) Noun

É mentira que são ricos e que vivem num luxo.
(It is not true that they are rich and that they live in luxury.)
- Coordination of Nominal Phrases (NP $\rightarrow$ NP^n)

1) P $\rightarrow$ F NP

a) NP<Z>e NP<Z>

\[ \{ \text{O José e a Maria} \text{ (Joseph and Mary)} \} \]

\[ \{ \text{trabalham.} \text{ (work.)} \text{ são diplomatas.} \text{ (are diplomats.)} \} \]

b) NP<P>e NP<P>

- Pronouns

\[ \text{Tu e eu somos estrangeiros.} \text{ (You and I are foreigners.)} \]

- Adjectivization

\[ \text{A pobre criatura e o filho infeliz tinham deixado de comer.} \text{ (The poor soul and her unfortunate son had stopped eating.)} \]

- Nominalization

\[ \text{A alegria do público e a esperança de alcançar o prêmio levaram-no a fazer as mais perigosas manobras.} \text{ (The joy of the public and the hope of obtaining the reward encouraged him to perform the most dangerous manoeuvres.)} \]

- Relativization

\[ \text{O homem que leva o burro e o amigo que finge ser saltimbanco são membros da mesma banda.} \text{ (The man who leads the donkey and his friend who pretends to be an acrobat are members of the same band.)} \]

c) NP<Z>e NP<P>

\[ \text{Elas e vários outros membros do conjunto dançam.} \text{ (They and several other members of the band are dancing.)} \]

\[ \text{A noite, a multidão e a ansiedade juntaram-se para formar uma barreira impenetrável.} \text{ (The night, the crowd, and the anxiety to make an impenetrable barrier.)} \]
O motorista e aquele homem que vem arranjar o jardim jantam aqui esta noite.
(The driver and that man who comes to tidy the garden dine here tonight.)

2) $F \rightarrow Z$ NP

a) Preposition NP\(<Z>\)

_Diante do professor e da esposa ele não se portou bem._
(He did not behave well in front of the teacher and his wife.)

b) Verb NP\(<Z>\)

_Vende livros e revistas._
(He sells books and magazines.)

c) Preposition NP\(<P>\)

- Adjectivization

_Diante do João e do seu irmão menor._ . . .
(In front of John and his younger brother. . .)

- Nominalization

_Diante do crime e da evidente satisfação das testemunhas, o João também se sentia culpado._
(John felt guilty after the crime and the witnesses statements.)

- Relativization

_O mercúrio líquido caiu sobre o engenheiro e vários operários que o acompanhavam._
(The liquid mercury fell on the engineer and the workers who were accompanying him.)

d) Verb NP\(<P>\)

- Adjectivization

_O José compra carros usados e toda a espécie de quinquilharia._
(Joseph buys used cars and all kinds of junk.)
- Nominalization

Preciso da tua coragem e da tua proteção.
(I need your courage and your protection.)

- Relativization

Pediu-me a caneta e todas as folhas que sobejavam.
(He asked me for my fountain pen and all the sheets that remained.)

1. Gapping Transformation

Gapping deals with the cases of deletion in presence of identity which characterizes the coordinated structures. These cases may be opposed to those instances of deletion which are the product of an anaphoric element and end in a Pronominalization. These two types of operations and their relations are illustrated with the following examples.

1) O José guarda as notas na carteira e o troco na algibeira.
   (Joseph keeps the bills in his wallet and the change in his pocket.)

   a) O José guarda as notas na carteira e guarda o troco na algibeira.
      (Joseph keeps the bills in the wallet and keeps the change in his pocket.)

2) O José guarda as notas na carteira e a Maria na gaveta.
   (Joseph keeps the bills in his wallet and Mary keeps them in the drawer.)

   a) O José guarda as notas na carteira e a Maria guarda-as na gaveta.
      (Joseph keeps the bills in his wallet and Mary keeps them in the drawer.)

3) O José guarda as notas na carteira e a Maria o troco na algibeira.
   (Joseph keeps the bills in his wallet and Mary her change in the pocket.)
a) O José guarda as notas na carteira e a Maria guarda o troco na algiêtra.
   (Joseph keeps the bills in his wallet and Mary keeps the change in her pocket.)

4) O José guarda as notas no banco e a Maria o troco.
   (Joseph keeps the bills in the bank and Mary keeps her change.)

a) O José guarda as notas no banco e a Maria guarda lá o troco.
   (Joseph keeps the bills in the bank and Mary keeps her change.)

Sentences (a) of the four examples follow the normal rules of Pronominalization, and when there is identity, they substitute for an anaphoric form. Sentences (1), (2), (3) and (4) show deletions in the second proposition of the coordinated structure. These deletions are of different constituents. The operation focuses on the subject NP and the verb in sentence (1), on the verb and the complement in sentence (2), on only the verb in sentence (3), and on the verb and its adverb in sentence (4).

Gapping always causes the deletion of the predicate, regardless of the nature of the other constituents that are deleted with it. This is how the Gapping Transformation differs from the Pronominalization Transformation. If the F<Z> is different in the two embedded propositions, and in presence of identity in the coordinated structures, there will be Pronominalization.

Where there is identity of predicate, by definition the first Z to the left, dominated by the occurrence of the least embedded of F, deletion can take place. This last operation is carried out in the following transformation.
Gapping (optional)

| SD          | P<\textcolor{red}{ou}\textcolor{blue}{P}<\textcolor{green}{F}<\textcolor{red}{Z}\%>\%> | 1 2 3 4 5 6 7 8 9 11 13 |
|-------------|-------------------------------------------------------------------------------------------------|

SC ERASE 11

Cond 5 EQ 11

SC ERASE 12

Cond 11 Nu1, 6 EQ 12

SC ERASE 13

Cond 11 NUL, 7 EQ 13

Gapping II

There is another case of gapping. It is the deletion of the NP or P complement of F, illustrated in the following examples.

1) *Fã-lo-e onde e quando queiras.*
   (I'll do it where and when you want to.)

2) *Fugirã com ou sem dinheiro.*
   (He will escape with or without money.)

3) *O João compra e vende casas.*
   (John buys and sells houses.)

4) *Promete e jura que se vingará.*
   (She promises and swears that she will get revenge.)

These sentences will be accounted for by the following transformation.

Gapping II (optional)

| SD          | P<\textcolor{red}{F}<\textcolor{green}{Z}\%>\%> | 1 2 3 4 5 6 7 8 9 10 11 12 |
|-------------|-------------------------------------------------------------------------------------------------|

SC ERASE 10

Cond 4 NEQ 9, 5 EQ 10

This grammar recognizes only two classes of coordination marked by the
conjunctions *e* (and) and *ou* (or). Within this hypothesis we examine the surface forms of the so-called "coordination-conjunctions."

**Nem** (nor)

In establishing the existence of a negation predicate and the coordination *e* or *ou*, there is no need to postulate the independent existence of a third type of coordination. The form *nem* always appears when there is a negation of two coordinated propositions, in a structure (a) or (b).

(a)

```
  P
 /\  \
F   P
 /\      /
P1  e   P2... e  Pn
```

(b)

```
  P
 /\  \
F   P
 /\      /
ou P1  ou P2... ou Pn
```

The form *nem* can be considered to have a transformational origin and to be the result of one of the two rules.

**Nem** I (obligatory)

SD  P<F P<P % e P %>
    1 2 3 4 5 6 7 8
The negative form *nem* has all the properties of the forms *e* and *ou*.

1) *O João não estuda ao sábado nem a Maria ao domingo.*
   (John does not study on Saturdays nor does Maria study on Sundays.)

2) *Nem o João se lembrou do gravador nem a Maria do rádio.*
   (Neither John remembered the tape recorder nor Mary the radio.)

Disassociating coordination and the negation is done in order to avoid the derivation of a copulative negative conjunction with an affirmative verb.

1) * *O João canta nem a Maria dansa.*
   (* John sings nor Mary dances.*)

The other conjunctions are different from the forms *e* and *ou* in that they are confined to coordinated structures having a maximum of two elements. We can group them all as predicates with the special property of requiring an argument which dominates a coordinated structure.

*Mas* (but)

This predicate carries a contextual feature $F_{>_P<P_eP>}$. 
Mas (obligatory)

SD P<F P<P e P> 1 2 3 4 5 6

SC 2 SUBSE 4, 3 SUBSE 1

Cond 2 EQ mas

Mas allows for Gapping, not because it carries all the properties of e, but because it is replaced by e and all the derived structures.

In dominating the coordination mas characterizes the following structures.

![Diagram]

1) *O José guarda as notas na carteira mas o troco na algibeira.*
   (Joseph keeps the bills in the wallet but the change in his pocket.)

2) *O João tem um carro azul mas o Jorge, verde.*
   (John has a blue car but George a green one.)

3) *O cão come ossos mas o gato come peixe.*
   (The dog eats bones but the cat eats fish.)

4) *Gosto que me fales mas não que me aborregas.*
   (I like you to speak to me but not to annoy me.)
2. Reciprocation

In connection with the reflexives, we have mentioned some structures which come from the presence of an inherent feature [+ Recip] in some predicates, and in some circumstances which come from the Transformation of Reciprocation I. Predicates such as casa, encontra, comparte, have the Inherent feature [+ Recip] in order to form the reciprocal structures by means of an optional Transformation of Reciprocation II, which derives (B) from (A).

\[(A) \to (B)\]

This structure undergoes then the Transformation of Reflexivization, which follows in the cycle.

1) O Miguel e a Aparecida casam-se.
(Michael and Aparecida get married.)

The agreement of number is realized by a supplementary operation of this transformation, which changes [- plur] into [+ plur] in the presence of a structure of the type NP<NP e NP>. 
The second type of structure is derived from a coordinated construction in order to create the reciprocal form. Then we derive (D) from (C).

(C) \hspace{1cm} \text{Reciprocation I} \hspace{1cm} (D)

1) \textit{O Miguel e a Cida escrevem-se.}  
   (Michael and Cida correspond with each other.)

3. Gerundivization

The gerundive structure is connected with coordination. There are two types.

1) \textit{Encontrá-lo-ás no café lendo o jornal.}  
   (You'll meet him in the cafe reading the paper.)

2) \textit{Descendo a escada encontrou o amigo.}  
   (Going down the stairs he met his friend.)

The first type of structure (1) is the result of an Adjectivization.
Sentence (2) would have the following analysis.

The following transformation will apply.
Gerundivization (optional)

SD  \[P\langle P\langle F\langle Z\rangle \%\rangle NP\rangle \rangle \triangleleft P\langle P\langle F\rangle NP\rangle \]
\[1 2 3 4 5 6 \quad 7 8 9 10\]

SC  ERASE 6, [+ ger] MERGEF 4

Cond  4 EQ 10

This optional transformation must precede the Gapping transformation in the cycle.
CHAPTER 6
IMPLEMENTATION OF THE PORTUGUESE GRAMMAR
ON THE COMPUTER

INTRODUCTION

This chapter presents the adaptation of my Portuguese grammar to the computer system for transformational grammar devised by J. Friedman (1971). To transcribe a relatively formal grammar into the notation of the system, the grammar had to be modified. Further modifications were made when tested on the system. The grammar yielded some inaccuracies. Whenever one rule was modified the repercussions on the whole grammar were tested immediately. This chapter does not discuss the modifications, but presents only the final modified grammar.

I. THE COMPUTER MODEL

The computer model consists of a grammar format and algorithm for deriving sentences. The features of the model and the system include a formal description of the syntax of transformational grammar, a phrase-structure generation scheme, a format for the lexicon and a lexical insertion algorithm, and a language for specifying the traffic rules of a grammar.
Friedman has selected Fortran IV for the programming language, even though it is generally unsuited to string manipulation. To avoid the problems with string-handling that are inherent in Fortran, an input-output subroutine package in Doran (1967) was written to handle free-field data. The program consists of approximately 10,000 lines of Fortran code, including comments. The program has been run on the IBM 360/67 at Stanford University under the IBM OS-operating system, and on the IBM 360/67 at the University of Michigan under the Michigan terminal system, MTS. A copy of the computer program has been acquired by the statistical centre and has been run on the IBM 360/67 at the Centre Computing Terminal at the University of British Columbia.

The programming for the implementation of my Portuguese grammar was conducted by Mary Moran-Nanson at the Statistical Centre.

1. Notations

The notation is a system described in a formal metalanguage.

a) The Non-Terminal Symbols

The non-terminal symbols used as labels for nodes follow the terminology used in my grammar. Only the symbol $S$ for Sentence is required by the computer system.

<table>
<thead>
<tr>
<th>Symbol Used</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S$</td>
<td>Sentence</td>
</tr>
<tr>
<td>$P$</td>
<td>Proposition</td>
</tr>
<tr>
<td>$F$</td>
<td>Verb Phrase</td>
</tr>
</tbody>
</table>
b) **Transformations**

The notation for the transformations is that of Friedman *et al.* (1971). Most of it will be clear from the context. A few abbreviations are:

1) **Title**

TRANS 19 QUEINS "QUE-INSERTION" I OB AC

This title introduces transformation No. 19. It contains the name QUEINS, a short description of the transformation. "Que-insertion," the group to which it belongs I, the marker OB for an obligatory transformation (if the transformation is optional the marker OP appears) and the type of transformation AC.

2) **Structural Description** (SD)

The structural description is similar to the usual form. Terms in the structural description have numbers only for later reference to the conditions.

A<BC> A directly dominates B and C

A/<BC> A dominates B and C

(A) A is optional
(A, B) either A or B may be matched 
%
a variable

3) **Structural Change (SC)**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERASE 2</td>
<td>Erase the node marked 2 by the SD</td>
</tr>
<tr>
<td>2 ALESE 5</td>
<td>The node marked 3 is added as a left sister of the node 5, and erased from its original position</td>
</tr>
<tr>
<td>3 ARISE 5</td>
<td>idem, but right sister</td>
</tr>
<tr>
<td>3 ALADE 5</td>
<td>idem, but last daughter</td>
</tr>
<tr>
<td>3 AFIDE 5</td>
<td>idem, but first daughter</td>
</tr>
<tr>
<td>3 ACHLE 5</td>
<td>The node marked 3 by the SD is Chomsky-adjoined at the left of node 5, and erased from its original position</td>
</tr>
<tr>
<td>3 ACHRE 5</td>
<td>idem, but at the right</td>
</tr>
<tr>
<td>3 SUBSE 5</td>
<td>The node 5 is replaced by the node 3 and the original disappears</td>
</tr>
</tbody>
</table>

The operations ADLES, ADRIS, ADLAD, ADFID, ADCHL, ADCHR and SUBST, correspond to ALESE, ARISE, ALADE, AFIDE, ACHLE, ACHRE and SUBSE respectively, but a copy is adjoined and the node is not erased from its original position.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>[+ A]</td>
<td>MERGEF 3</td>
<td>The feature [+ A] is merged into the set of features attached to node 3.</td>
</tr>
<tr>
<td>[- A]</td>
<td>ERASEF 3</td>
<td>The feature [+ A] or [- A] is erased from the set of features attached to node 3.</td>
</tr>
</tbody>
</table>
All features attached to the node 3 are erased with the exception of feature |+ A|.
The feature |+ A| or |- A| with value as in node 3 is moved to node 5.

4) Conditions

The conditions on transformations given in the original version are unacceptable in this format. They had to be translated, and now appear under the heading WHERE.

A & B  Condition A and condition B
A / B  Condition A or condition B
3 TRM  Node 3 is terminal
3 NUL  Node 3 is null
3 NNUL Node 3 is non-null
3 INCL |+ A|  Node 3 includes the feature |+ A|
3 DOM A  Node 3 dominates A
3 NDOM A  Node 3 does not dominate A
3 EQ 5 Node 3 and 5 are equal.

2. Phrase-Structure

"Portuguese Grammar"

Phrase Structure
S = #P#.
P = ( S(K S(K S)),F((S(K S(K S)),NP(K NP (K NP))))).
F = ( F(K F(K F)),Z((S,NP(NP) (NP)))).
NP = (NP(K NP(K NP) ),(D) N,S).
\[ K = (E,OU). \]
\[ N = Z. \]
\[ D = Z. \]

\textit{$END$}

The computer form begins with the comment "PORTUGUESE GRAMMAR." All material within quotation marks is ignored by the program. \textit{PHRASE-STRUCTURE} and \textit{$END$} delimit the phrase structure component.

The rewriting symbol for the phrase structure rules is the equal sign, and each rule ends with a period. The computer form presents a linearization of the usual form, with both parentheses (options) and braces (choices) represented by parentheses. No ambiguity arises from this double use of parentheses because a comma distinguishes the choices from the options.

The phrase structure component of this grammar is derived from the proposals of Chomsky (1965), Rosenbaum and Lochak (1968), and Šajumian (1969).

A sentence consists of a proposition (P) which is a predicate (F) and a subject (NP). The predicate consists of either a verb or anything that belongs to this class (F), another sentence (S), or one or more complements (NP), any number of times. A noun-phrase (NP) is either another noun-phrase, any number of times, a noun with its optional determiner, or another sentence. The verb, the noun and the determiner are further assigned to another sign (Z) which allows the lexical insertion.

This phrase structure grammar differs, however, from those sources in several ways. First, it does not contain any prepositional phrases.
I follow instead here a proposal by Postal (quoted in R. Lakoff, 1968:65),
that the prepositions be introduced by a transformation. In my grammar
it is transformation number 46 "Preposition Insertion." The verbs that
take prepositions are marked in the lexicon. And second, it differs in
analyzing adjectives as verbs, following the proposal by G. Lakoff (1965).
Adjectives are marked in the lexicon with the feature +ADJ.

The lexical component consists of a lexicon and an algorithm
which uses the lexicon in inserting vocabulary words into trees. The
lexicon contains a preliminary part, or prelexicon, which includes the
definitions of contextual lists of category and inherent features and
redundancy rules. The lexical entries follow the prelexicon. The
lexical insertion algorithm selects lexical items from the lexicon
and inserts them into the tree. Lexical insertion occurs after the
generation of a preterminal string by the phrase structure and before
transformation. If a tree has embedded sentence subtrees, they are
considered in lowest to highest, left to right order. Within a sentence
subtree, a lexical item is inserted at each lexical category node appearing
in the subtree. The order in which categories are considered can affect
the efficiency of the insertion algorithm. Vocabulary words are selected
at random; the same terminal strings will not be obtained for the same
random numbers when different category orders are used.

The vocabulary word selected is inserted as a daughter of the
category node. The complex symbol obtained as a result of the compati-
bility test is attached to the category node.
3. Lexicon

The lexicon lists or defines under the headings CATEGORY, INHERENT, CONTEXTUAL, RULES and ENTRIES respectively.

Category features identify the nodes at which lexical items are inserted. The list determines the order of insertion.

Inherent features occur in complex symbols in the lexicon, and are also added by transformations.

Contextual features determine the context in which a vocabulary item can appear.

Redundancy rules add feature specifications to complex symbols.

Entries are the lexical items of the language. An entry may contain several vocabulary words that have the same complex symbol. The lexicon defines these features by giving a structural analysis of the context. The word is inserted at the location indicated by the underline symbol (_).

In a computer derivation of a sentence, lexical items are selected at random from those in the lexicon that are of the appropriate category, that match the inherent features already in the tree, and that have the contextual features satisfied by the tree.

1) **Category**

   Z

   The node which receives lexical items during the lexical insertion is Z. In this grammar the order for insertion is not essential.

2) **Inherent Features**

   PLUR MASC MALE NEG INTG HUM ANIM
   ABST NPROP PREP E
Inherent features appear in different parts of the grammar and have different functions accordingly. They may be lexical features ANIMATE, HUMAN, or morphological features MASCULINE. The role of inherent features will be presented with the parts of the grammar in which they are used.

3) Contextual Features

\[
\begin{align*}
V &= \langle F\_\rangle, \\
N &= \langle NP\_\rangle, \\
V1 &= \langle P\langle F\_\rangle S\rangle, \\
V2 &= \langle P\langle F\_NP\rangle S\rangle, \\
V3 &= \langle P\langle F\_ S\rangle S\rangle, \\
V4 &= \langle P\langle F\_ S\rangle NP\rangle, \\
V5 &= \langle P\langle F\_NP\rangle NP\rangle, \\
V6 &= \langle P\langle F\_\rangle NP\rangle, \\
V7 &= \langle P\langle F\_NP \_ZNP\rangle NP\rangle, \\
V8 &= \langle P\langle F\_NP NP\rangle, \\
V9 &= \langle P\langle F\_NP NP\rangle, \\
V10 &= \langle P\langle S\langle F\_\rangle NP\rangle, \\
\end{align*}
\]
VI1 = <S<N>NP>,
VI2 = <P<N>NP>,
NI = <N>>,
DET = <DET>>,
NP1 = <NP<DET N>>.

Contextual features describe contexts valid for the insertion of lexical items. The contextual features in this model differ from Aspects, both in form and in the conventions regarding their use. Contextual features include both subcategorization and selectional features as defined by Chomsky in Aspects. This distinction was not necessary to be made explicit in my grammar. A selectional feature would correspond to a contextual feature which contains at least one complex symbol. A vocabulary word is specified for a contextual feature only if the word can be inserted. A word with contextual features can thus appear at any appropriate category node. These contextual features require the appropriate lexical item to be inserted. They have the role which Perlmutter (1968) defines as deep structure constraints.

A contextual feature indicates an environment that must be present. A negatively specified contextual feature implies that the environment described by the feature must not be present.

4) Rules
|+HUM|  =>  |+ANIM|,
|+COMM|  =>  |*ANIM|,
|+ABST|  =>  |-ANIM +COMM|,
|+VERB|  =>  |*ADJ|,
$|+\text{ADJ}| \Rightarrow |+\text{VERB}|,$

$|+\text{COUNT}| \Rightarrow |+\text{COMM}|.$

These are called the Redundancy rules; they clarify further the lexical items for their insertion. Redundant feature specifications are added when the full form is needed.

The Redundancy rules of this model differ from those in Aspects, because they are not generative, but abbreviatory. They are applied at any time in the entire process of sentence generation when a complex symbol is modified.

The interpretation of a Redundancy rule is that any complex symbol that includes the complex symbol on the left-hand side of the Redundancy rule implicitly includes the complex symbol on the right. In the lexicon, these expansions remain implicit. The Redundancy rules are not ordered. When they are applied to expand a complex symbol the process terminates only when no further application is possible.

5) Entries

A $|+Z +\text{DET} -\text{MASC} +\text{PLUR}|,$

ACABA DE $|+Z +V1 +\text{AUX}|,$

ADVOGADO $|+Z +V6 -\text{VERB} +\text{MALE} +\text{MASC} +\text{HUM} +\text{PLUR}|,$

ALEGRE $|+Z +V6 -\text{VERB} +\text{ADJ} +\text{MASC} +\text{ABST}|,$

AMIGO $|+Z +N +\text{NOM} +\text{MASC} +\text{HUM} +\text{ANIM} +\text{PLUR}|,$

ANTÓNIO $|+Z +NP1 +\text{MALE} +\text{MASC} +\text{NPROP} +\text{HUM}|,$

BARBEA $|+Z +V9 +\text{VREFL}|,$

BARCO $|+Z +V6 +\text{COMM} +\text{MASC} +\text{PLUR}|,$

etc ...
The entries are represented in the singular masculine form for nouns and adjectives, unless they are inherently feminine, and in the third person present indicative singular for the verb.

The category symbol follows after each lexical item. The other features then succeed. During lexical insertion a value + or - is given to the symbol *, thus having the effect of feature rewriting rules. If a noun is inherently plural (i.e., *culos*, glasses) the feature |+ PLUR| appears in the list of its features.

The features have been defined in such a manner that the unmarked case corresponds to a negative feature. For example, I use | - MASC | and not | + FEM |, because the masculine form for nouns and adjectives comes from the unmarked form. For the same reason I use | - PLUR | and not | + SING | because the plural comes from the unmarked case by adding the morpheme -s. The choice of features PROGressive, PRETerit, FUTure and SUBjunctive implies that the unmarked case for the verb is the present of indicative (Schane, 1968:66-92).

4. Transformations

TRANS 1 GER 1 "GERUNDIVIZATION I" I OP.
SD #P<P<5Z 6F>7NP> E P<10F 11 NP>>#, WHERE 7 EQ 10.
SC ERASE 7, |+PR0G| MERGEF 5.
TRANS 2 RECIP1 "RECIPIRATION1" OB AC.
SD #P<P<F<5Z 6NP>7NP 8E 9P<F<11Z 12NP> 13NP>>>#, WHERE 6 EQ 13 & 7 EQ 12 & 5 EQ 11 & 5 INC1 |+RECI|.
The transformational component of this grammar consists primarily of a set of transformations, but it must also contain what Fillmore (1963) has called "Traffic Rules" that specify the order in which the transformations are applied. The Traffic Rules or CP "control program" are given in the transformational component of the grammar. The "control program" allows one to group transformations into ordered sets and to apply transformations either individually or by transformation set. It also allows us to specify the order in which the transformation sets are to be considered and to specify the subtrees in which a transformation set is to be applied. The application also depends on which transformations have previously modified the tree. The purpose of the "control program" is to determine in which order in the derivation and at what point in the tree a transformation is invoked.

Thus, in the control sequence "apply the cyclic transformations to the lowest sentence," the "control program" must select the lowest sentence subtree and then invoke the transformations in order for that subtree. The supplementary transformation LOWESTS simply selects the lowest sentence with boundaries. It does not have structural change. The "control program" specifies that the cyclic transformations (group I)
apply in the lowest sentence. At the end of a cycle the boundaries are erased, by TRANS 34 BDEL "Boundary Deletion," and the next highest sentence becomes lowest. After the last cycle, the tree is output, and the post-cyclic transformations (group II) apply.

The transformational component consists of a list of transformations and a control program:

Transformations [transformations]
CP control-program. $

A dollar sign terminates this component, as it does for the phrase-structure and lexicon.

A transformation has three obligatory parts.

TRANS = identification
SD = structural description
SC = structural change

and an optional fourth part,

WHERE = the conditions on the transformation. Each part is preceded by an identifier and followed by a period.

5. Conclusion

This chapter presents the computer version on my Portuguese grammar. I have used J. Friedman's model which allows some flexibility in making theoretical adaptations and possible choices within the theory of transformational grammar.

Computer verification of the grammar is very valuable because writing a transformational grammar is intrinsically difficult. The
linguist must understand first how the language works, but there are many purely technical problems in making the grammar describe the observed phenomena. A rule may behave as intended in isolation, but in the grammar it must interact properly with all other rules. Thus, the linguist needs to consider the grammar as a whole. It is very valuable to use the computer as a "rule-tester" and as a "grammar tester."
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(1966b)


(1968a)


(1968b)


(1970a)


(1963-1969)


(1965a)


(1965b)


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APPENDIX A

PORTUGUESE GRAMMAR
APPENDIX A

Reproduced here is an abbreviated sample of the Portuguese syntactic grammar.

I. BASE RULES

1. $S \rightarrow \# P \#$

2. $P \rightarrow \{ S^n_F \} \{ S^n_{NP^n} \}$

3. $F \rightarrow \{ F^n_S \} \{ S_{NP^n} \}$

4. $NP \rightarrow \{ NP \} \{ Z_S \}$

5. $%n \rightarrow \{ %1 e %2 \ldots %n \} \{ %1 ou %2 \ldots %n \}$

II. LEXICON

1. Categorial Features
   1) $\{ + \hbox{verb} \}$
   2) $\{ + \hbox{noun} \}$
2. Inherent Features

1) [+ plur]
2) [+ aux]
3) [+ comp]
4) [+ det]
5) [+ masc]
6) [+ subdel]
7) [+ vrefl]
8) [+ proppn]
9) [+ nomm]
10) [+ adv]
11) [+ intg]
12) [+ pers]
13) [+ prep]
14) [+ antep]
15) [+ male]
16) [+ neg]
17) [+ com]
18) [+ de]
19) [+ mente]
20) [+ recip]

3. Contextual Features

1) F<_>P
2) F<_ NP>P
3) F<_ P>P
4) F<_ P>NP
5) F<_ NP>NP
6) F<_ NP
7) F<_ NP NP>NP
8) F<_ P NP>NP
9) NP<_>
4. Redundancy Rules

1) $|+ \text{verb}| \rightarrow |\pm \text{adj}|$
2) $|+ \text{adj}| \rightarrow |+ \text{verb}|$
3) $|\pm \text{verb}| \rightarrow |\pm \text{adv}|$
4) $|+ \text{hum}| \rightarrow |+ \text{anim}|$
5) $|+ \text{comm}| \rightarrow |+ \text{anim}|$
6) $|+ \text{abst}| \rightarrow |- \text{anim}|$
7) $|+ \text{count}| \rightarrow |+ \text{comm}|$
8) $|\pm \text{iter}| \rightarrow |\pm \text{past}|$
9) $|+ \text{1 pers}| \rightarrow |+ \text{2 pers}|$
10) $|+ \text{2 pers}| \rightarrow |+ \text{você}|$

5. Entries

1) Compra "buys"
   $|+ \text{verb}|$
   $|+ \text{você}|$
   $F<_{\text{NP}}^{>\text{NP}}$

2) Acaba de "have just"
   $|+ \text{verb}|$
   $|+ \text{você}|$
   $|+ \text{aux}|$
   $F<_{>\text{P}}$

3) Alegre "happy"
   $|+ \text{adj}|$
   $|\pm \text{masc}|$
   $F<_{>\text{NP}}$

4) Casa "marries"
   $|+ \text{verb}|$
   $|+ \text{recip}|$
   $|+ \text{com}|$
   $F<_{\text{NP} (\text{NP})>\text{NP}}$

5) Quando "when"
   $|\pm \text{verb}|$
   $|+ \text{adv}|$
   $F<_{(\text{P, NP})>\text{P}}$

6) Desastre "accident"
   $|+ \text{noun}|$
   $|+ \text{com}|$
   $|+ \text{masc}|$
   $F<_{>\text{NP}}$
7) Dois "two"

|+ noun|
|± det|
|+ plur|
|+ antep|
F<>_NP

8) Este "this"

|- verb|
|+ adj|
|± det|
|+ masc|
|± plur|
F<>_P

9) Até "until"

|- verb|
|+ prep|
|+ subdel|
F<_(NP, P)>P

10) Inútil "useless"

|- verb|
|+ adj|
|± masc|
|+ mente|
F<>_P

11) Muito "very"

|- verb|
|+ adv|
|+ antep|
|± det|
F<>_NP

12) Chove "rains"

|+ verb|
|+ vocé|
F<_(NP)>NP

13) Mentira "lie"

|+ noun|
|- masc|
|+ abst|
F<>_NP

14) Preto "black"

|- verb|
|+ adj|
|+ masc|
F<>_NP
III. TRANSFORMATIONS

A. Cyclic

1. Gerundivization (OP)\(^1\)

\[ SD \quad \# \quad P < P < F < Z \quad % < N P \quad e < P < F \quad N P \quad \# \]

\[ 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10 \quad 11 \quad 12 \]

\(^1\)OP = optional
\(^2\)OB = obligatory
SC ERASE 7, |- ger| MERGEF 5
Cond 6 EQ 10

2. **Reciprocation (OB)**

SD # P<P<F<Z NP>NP e P<F<Z NP>NP>#
1 2 3 4 5 6 7 8 9 10 11 12 13 14

SC 12 ACHRE 6, 13 ACHRE 7, 8 ADRIS 6, 8 ARISE 7, ERASE 9
Cond 6 EQ 13, 7 EQ 12, 5 EQ 11, 5 INCL |+ Recip|

3. **Gapping II (OP)**

SD # P<F<Z %>(e, ou) % F<Z %>% %>%#
1 2 3 4 5 6 7 8 9 10 11 12 13 14

SC ERASE 10
Cond 4 NEQ 9, 5 EQ 10

4. **Gapping I (OP)**

SD # P<ou) P<F<Z %>% %>(e, ou) P<F<Z %>% %>%#
1 2 3 4 5 6 7 8 9 10 11 12 13 14

SC ERASE 12, ERASE 13, ERASE 14
Cond 6 EQ 12, 7 EQ 13, 8 EQ 14

5. **Subject Raising (OB)**

SD # P<F<Z P<F<Z %>NP>NP>#
1 2 3 4 5 6 7 8 9 10 11

SC 9 ADRIS 5
Cond 4 INCL |+ comp|
6. **Embedded Subject Deletion I (OB)**

<table>
<thead>
<tr>
<th>SD</th>
<th># P&lt; Z P&lt; NP&gt;(NP) %NP&gt; #</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5 6 7 8 9 10 11</td>
</tr>
</tbody>
</table>

| SC | ERASE 8 |

| Cond | 4 INCL | + subdel |, 7 EQ 8 / 10 EQ 7 |

7. **Embedded Subject Deletion II (OB)**

<table>
<thead>
<tr>
<th>SD</th>
<th># P&lt; Z NP&gt;P&lt; NP&gt; #</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
</tbody>
</table>

| SC | ERASE 8 |

| Cond | 4 INCL | + subdel |, 5 EQ 8 |

8. **Auxiliary (OB)**

<table>
<thead>
<tr>
<th>SD</th>
<th># P&lt; Z P&lt; Z %&gt; %&gt; #</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
</tbody>
</table>

| SC | MOVEF 7, MOVEF 4, |+ inf| MERGEF 7, 4 ACHLE 6, 5 SUBSE 2 |

| Cond | 4 INCL | + aux |

9. **Nominalization II (OP)**

<table>
<thead>
<tr>
<th>SD</th>
<th># P&lt; NP&lt;P&lt; F&lt; Z F&lt; Z %&gt; NP&lt; Z %&gt; %&gt; %&gt; #</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5 6 7 8 9 10 11 12 13</td>
</tr>
</tbody>
</table>

| SC | ERASE 6, |+ de| ADLES 12, |+ adj| ERASE 8, 7 ARISE 11, 10 SUBSE 3 |

| Cond | 8 INCL | + nonim |, 6 EQ 6 |

10. **Nominalization I (OP)**

<table>
<thead>
<tr>
<th>SD</th>
<th># P&lt; NP&lt;P&lt; F&lt; Z F, Z (NP, P) %&gt; %&gt; %&gt; #</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5 6 7 8 9 10 11 12</td>
</tr>
</tbody>
</table>

| SC | |+ de| MERGEF 7, |+ de| MERGEF 12, ERASE 8, 12 ALADE 3, |
|    | SUBSE 4, 5 SUBSE 7 |

| Cond | 7 NNUL, 7 NINCL | + prep |, 6 INCL | + noun |
11. **Genitive Formation (OP)**

SD \# %<(Z) NP<Z>&% #
1 2 3 4 5 6 7

SC MOVEF 3, MOVEF 5, [+ gen] MERGEF 5, ERASE 3 / [+ de] ERASE 5
Cond 5 INCL [+ 1 pers] [+ 2 pers]

12. **Adjectivization (OP)**

SD # P /<NP<P+F<Z F>>NP)>>#
1 2 3 4 5 6 7 8 9

SC 7 ALADE 8, 8 SUBSE 3
Cond 6 EQ é

13. **Relativization (OB)**

SD # P /<NP<P /<NP<Z %>>>
1 2 3 4 5 6 7 8

SC 5 ADLES 4, [+ que] MERGEF 6
Cond |ou, e, que| / 5

14. **Subjunctivization (OB)**

SD # P<F<Z %P<F<Z %>%# 
1 2 3 4 5 6 7 8 9 10 11

SC [+ subj] MERGEF 8, 6 SUBSE 2
Cond 4 INCL [+ imp]

15. **Interrogation (OB)**

SD # P<F<Z P %>%#
1 2 3 4 5 6 7 8

SC [+ intg] MERGEF 5, 5 SUBSE 2
Cond 4 INCL [+ intg]
16. **Negation I (OB)**

SD

\[
\begin{array}{cccccccccc}
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12 & 13 \\
\end{array}
\]

SC  

|+ neg| MERGEF 4

Cond 7 INCL |+ neg|, 11 INCL |+ neg|

17. **Infinitivization (OB)**

SD

\[
\begin{array}{cccccccc}
1 & 2 & 3 & 4 & 5 & 6 & 7 \\
\end{array}
\]

SC  

|+ perf| SAVEF 5, |+ inf| MERGEF 5

18. **Adverbialization (OB)**

SD

\[
\begin{array}{cccccccccc}
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 \\
\end{array}
\]

SC  

4 ALADE 7, 6 SUBSE 2

Cond 4 NINCL |- adv|

19. **Que-insertion (OB)**

SD

\[
\begin{array}{cccccccc}
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
\end{array}
\]

SC  

|+ que| MERGEF 3, |+ subj| MERGEF 5

Cond IF <5 INCL |+ verb|> THEN < NNUL 1 >, P 3

20. **Infinitivization of Subject Proposition (OP)**

SD

\[
\begin{array}{cccccccc}
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\
\end{array}
\]

SC  

|+ perf| SAVEF 6, |+ inf| MERGEF 6, A ADFID 5, |+ de| ADLES 6
21. Pronominalization (OB)

SD 
# P<F /<NP Z %»NP %»#
1 2 3 4 5 6 7 8 9

SC |+ pron| MERGEF 5

Cond 7 EQ 4

22. Focalization (OP)

SD 
# P<F<Z>P<F<Z (NP, P) (NP) %>(NP, P)>>#
1 2 3 4 5 6 7 8 9 10 11 12

SC MERGEF 5, 6, 8, 9, 11, 5 SUBSE 2, 5 ADFID 10

Cond 4 EQ |+ focus|, 10 EQ 2 / 3, 10 INCL |+ focus|

23. Emphatic (OP)

SD 
# P /<(P, F, NP)<Z %>%#
1 2 3 4 5 6 7

SC 3 ADCHL 2, |+ que| MERGEF 4, ERASE 5

Cond 3 INCL |+ focus|

24. Topicalization (OP)

SD 
# P<F<Z (NP, P) (NP %>(NP, P)>#
1 2 3 4 5 6 7 8 9

SC 7 ADCHL 2

Cond 7 EQ 3, 5, 6, 7, 9, 7 NINCL |+ focus|

25. Preposition Insertion (OB)

SD 
# P<F<Z (NP, P) (NP %>%#
1 2 3 4 5 6 7 8 9

SC 7 MERGEF 5, 8 MERGEF 6

Cond 4 INCL |+ prep|
26. Negation II (OB)

SD  # P<F<Z>P<F<Z %>%#
1 2 3 4 5 6 7 8 9 10
SC  |+ neg| MERGEF 7, 5 SUBSE 2
Cond 4 INCL |+ neg|

27. Incorporation (OB)

SD  # P<F<Z> NP<Z %>%#
1 2 3 4 5 6 7 8
SC  |+ intg| MERGEF 6, |+ neg| MERGEF 6, 5 SUBSE 2
Cond 4 EQ |+ intg| / 4 EQ |+ neg|

28. Passive (OP)

SD  # P<F<Z (P, NP) %>NP)#
1 2 3 4 5 6 7 8
SC  |+ por| MERGEF 7, 7 ADLES 5, 5 SUBSE 7, |+ verb| ERASE 4, ERASE 7
Cond 3 INCL |+ verb|

29. Reciprocation II (OP)

SD  # P<F<Z NP NP %>NP)#
1 2 3 4 5 6 7 8 9
SC  6 ADCHR 8, 6 ACHR 5, e ADRIS 8, e ADRIS 5
Cond 4 INCL |+ recip|, 5 EQ 8

30. Reflexivization I (OB)

SD  # P<F<Z NP<Z %>(NP<Z %)% % NP)#
1 2 3 4 5 6 7 8 9 10 11 12 13
SC  |+ Refl| MERGEF 6, |+ Refl| MERGEF 9
Cond 5 EQ 12, 8 EQ 12
31. **Noun Agreement** (OB)

   SD # P<Z %>NP<Z %>%#  
   1 2 3 4 5 6 7 8 9

   SC |+ masc + plur| MOVEF 6, |+ masc| MOVEF 3, |+ masc + plur|  
   ERASE 6, |+ masc, + male| SUBSEF 3, MOVEF 3, 6

   Cond 3 NINCL |+ male|, 6 INCL |+ plur|

32. **É-insertion** (OB)

   SD # P<Z %>%#  
   1 2 3 4 5 6 7

   SC É ACHLE 3

   Cond 4 NINCL |+ verb|, 4 NINCL |- É|

33. **É-Agreement** (OB)

   SD # P<Z F<Z %>%#  
   1 2 3 4 5 6 7 8 9

   SC |+ plur +1 pers| MOVEF 6, 4

34. **Boundary Erasure** (OB)

   SD S<# % #>  
   1 2 3 4

   SC ERASE 2, ERASE 4

B. **Post-Cyclic**

35. **Adjective or Proper Noun Anteposition** (OP)

   SD % NP<Z % F<Z>%>%  
   1 2 3 4 5 6 7 8

   SC 6 SUBSE 3, 5 ARISE 3

   Cond 6 INCL |+antep, - det, + propnoun|, 7 NUL
36. **Imperative (OP)**

SD \[ P \langle F \langle Z \% \rangle N P \langle Z \% \rangle \rangle \]
\[ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \]

SC \ [+ \ imp] \ SUBSEF \ [+ \ subj] \ 3, \ ERASE \ 5

Cond 3 NINCL \ [+ \ neg], \ 6 \ INCL \ [+ \ 2 \ pers]

37. **Interrogative II (OB)**

SD \[ P \langle F \langle (N P \langle N P \rangle) \% \rangle N P \rangle \]
\[ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \]

SC \ [+ \ intg] \ MERGEF \ 1

Cond 4, 5, 7 INCL \ [+ \ intg]

38. **Interrogative Deletion (OB)**

SD \[ P \langle Z \ N P \langle Z \rangle \rangle \]
\[ 1 \ 2 \ 3 \ 4 \]

SC \ ERASE \ 3

Cond 4 INCL \ [+ \ intg], \ 2 \ EQ \ [+ \ como, \ + \ quando]

39. **Impersonalization (OB)**

SD \[ % P \langle F \langle Z \% \rangle N P \langle Z \% \rangle \% \rangle \]
\[ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 9 \]

SC \ [+ \ Refl] \ MERGEF \ 8

Cond 5 NINCL \ [+ \ Refl], \ 3 \ /<E>

40. **Subject Anteposition (OP)**

SD \[ P \langle (N P, P) \rangle \]
\[ 1 \ 2 \ 3 \]

SC \ 3 \ AFIDE \ 1
41. **Adverb Anteposition (OP)**

   SD  % F<% F<Z %>%>%
       1 2 3 4 5 6 7 8
   SC  4 ALASE 1

42. **Qu-Insertion (OB)**

   SD  P<% /<(Z) NP<Z %>>>
       1 2 3 4 5 6
   SC  3 AFIDE 1, 4 ALESE 2

   Cond 3 INCL + prep|, 5 INCL + qu|

43. **Pronominalization II (OP)**

   SD  P/<NP<Z F %>%<NP<Z F %>>>
       1 2 3 4 5 6 7 8 9 10
   SC  |+ propnoun| MERGEF 8, ERASE 9

   Cond 4 EQ 9

44. **Clitic II (OB)**

   SD  %<F<% Z % NP<Z %>%>%>
       1 2 3 4 5 6 7 8 9 10 11
   SC  7 ADFIDE 2, ERASE 6, 6 AFIDE 2

   Cond 3, 6 NINCL F, 7 NINCL + 1 pers, + 2 pers, + Refl|

45. **Clitic II (OP)**

   SD  P<% F<Z %>>
       1 2 3 4 5
   SC  3 ARISE 4
46. **Preposition Formation** (OB)

SD  % NP<Z>%
     1 2 3 4 5
SC  1 ADFID 2, ERASE 3

47. **Que-Formation** (OB)

SD  % P%
     1 2 3
SC  |+ que| ADFID 2 |+ que| ERASE 2
Cond 2 INCL |+ que|

48. **Não-Insertion** (OB)

SD  P<% F<% Z>%
     1 2 3 4 5 6 7
SC  |+ não| ADFID 3, |+ neg| ERASE 5
Cond 5 INCL |+ neg|, 2 / |+ neg|

49. **Subject Pronoun Deletion** (OP)

SD  P<(NP<Z>) F(NP<Z>)
     1 2 3 4 5 6
SC  ERASE 2, ERASE 5
Cond 2, 5 NNUL, 3, 6 NINCL |+ Refl, + neg, + intg|

50. **Determiner Deletion** (OP)

SD  % NP<% Z F<Z>%%
     1 2 3 4 5 6 7 8
SC  ERASE 4
APPENDIX B

PORTUGUESE GRAMMAR

COMPUTER PROGRAM

363
$SIG PORT T=2M P=60
**LAST SIGNON WAS: 11:57:12 WED JAN 10/73

USER "PORT" SIGNED ON AT 13:37:01 ON WED JAN 10/73

$R STAT:FRIDMAN 7=*DUMMY* 8=*DUMMY* 9=*DUMMY*
EXECUTION BEGINS
"PORTUGUESE GRAMMAR"
PHRASE STRUCTURE
S=NP.
P=(S(K S(K S)),F((S(K S(K S)),NP(K NP (K NP)))),F=(F(K F(K F)),Z((S, NP(NP) (NP)))).
NP=(NP(K NP (K NP)), (D) N, S).
K=(E, OU).
N=Z.
O=Z.
$ END

LEXICON

CATEGORY 7.
INHERENT  PLUR  MASC  MALE  NEG  INTG  HUM  ANIM
ABST  NPROP  PREP  E  PRA

PERS  PERS1  PERS2  VOICE  AUX  RECIP
COMP  ADV  FOCUS  DEF  VREFL  VERR
REFLX  SUBDEL  NOM  ANTEP  DUMMY

DEF  DEM  PRON  GEN  SUBJ  REL
MENTE  PROG  NUM  PERF  INF  ITER  PREA
PAST  FUT  IMP  PRES  IMPs  COMM  ADJ  COUNT  PREC  COM

DET  PREDE  POR  EM  COM  QUE  SUBJ  QUE  REFL.

CONTEXTUAL
V=<F<>>,
N=<NP<>>,
V1=<P< S>>, V2=<P< NP>>,
V3=<P< S>>, V4=<P< S>>, V5=<P< S>>,
V6=<P< NP>>, V7=<P< NP>>, V8=<P< NP>>,
V9=<P< NP>>, V10=<P< S>>, V11=<P< S>>,
V12=<P< NP>,
N1=<N<>>,
DET=<DET>>,
NP1=<NP< NP<>>,

RULES
| +HUM | => | +ANIM |
| +COMM | => | +COMM |
| +ABST | => | -ANIM  +COMM |
| +VREFL | => | +ADJ |
| +ADJ | => | +VREFL |
| +COUNT | => | +COMM |

ENTRIES
A  | +Z  +DET  -MASC  *PLUR |
ACABA  | +Z  +V6  +VREFL |
ANDERSON  | +Z  +V6  +VREFL |
ALEGRE  | +Z  +V6  +VREFL |
ALFACE  | +Z  +V6  +VREFL |
ANGEL  | +Z  +V6  +VREFL |
ANTONIO  | +Z  +V6  +VREFL |
ATE  | +Z  +V6  +VREFL |
ATREVE  | +Z  +V6  +VREFL |
BARBARA  | +Z  +V6  +VREFL |
BARCO  | +Z  +V6  +VREFL |
CAFE 1 +7 + N + NOM + MASC + COMM + PLUR | NPM + MASC + COMM *PLUR | •
CARRO 1 +7 + N1 + COMM + MASC + PLUR | NPM + MASC + COMM *PLUR |
CASA 1 +7 + N - MASC + PLUR | NPM + MASC + COMM *PLUR |
CASA COM 1 +7 + V7 + VERB + PREP + PRECOM |
CAVALO 1 +7 + V6 + ANIM + MASC + PLUR | NPM + MASC + COMM *PLUR |
CHAVE 1 +7 + V6 + COMM - MASC + PLUR | NPM + MASC + COMM *PLUR |
CHOVE 1 +7 + V + VEPB |
COM 1 +7 + V2 + PREP |
COMPRA 1 +7 + V9 + VERB |
CORRE 1 +7 + V11 + VERB |
CRITANCA 1 +7 + NP1 - VERB * MASC - HUM * PLUR |
DE 1 +7 + V5 + PRPP |
DEPRESSA 1 +7 + V7 + ADV |
DESASTRE 1 +7 + N + MASC |
DESCE 1 +7 + V6 + VERB |
DISCOS 1 +7 + N1 + COMM + MASC + PLUR |
DOENTE 1 +7 + NP1 + NOM + MASC + HUM + ANIM + PLUR |
DOIS 1 +7 + V6 + MASC + NUM |
E 1 +7 + V6 |
ELE 1 +7 + N + PRON - VOCE - PERS1 - PERS2 - PLUR |
ELEFANTE 1 +7 + V6 + MASC + ANIM + PLUR |
ENCONTRA 1 +7 + V5 + VERB |
ENSINA 1 +7 + V7 + VEPB |
ESCU A 1 +7 + N + NOM - MASC - ABST + COMM + PLUR |
ESCREVE 1 +7 + V6 + VERB |
ESTE 1 +7 + V6 + DEM + MASC + DET + ANTEP |
EU 1 +7 + N + PRON + PERS1 - PLUR |
EXAME 1 +7 + V6 + COMM + MASC + PLUR |
FESTA 1 +7 + V6 + ABST - MASC + PLUR |
FUTURA 1 +7 + NP1 + COMM - MASC + PLUR |
IDEIA 1 +7 + V4 - VERB + ABST - MASC + PREDE + PLUR |
IMAGINA 1 +7 + V4 + VERB |
IMPLICA 1 +7 + V3 + VERB |
INUTIL 1 +7 + V1 - VEPB + ADV + MASC + MENT |
IR A 1 +7 + V4 + VERB + PRA |
IPMA 1 +7 + V6 - MALE - MASC + HUM + PLUR |
JOAO 1 +7 + NP1 + HUM + NPROP + MASC + MALE |
JOIA 1 +7 + V6 + COMM - MASC + PLUR |
JORGE 1 +7 + V6 + HUM + MALE + MASC + NPROP |
JORNAL 1 +7 + N + NOM + COMM - ABST + MASC + PLUR |
JOSE 1 +7 + V6 + HUM + NPROP + MALE + MASC |
JOVEM 1 +7 + V6 + MASC + ADJ + PLUR |
MARIA 1 +7 + NP1 + MALE - MASC + NPROP + HUM |
MAS 1 +7 + V3 |
MENTIRA 1 +7 + V6 + ABST - MASC + PLUR |
MESA 1 +7 + V5 + COMM - MASC + PLUR |
MINHA 1 +7 + V4 - MASC + PERS1 + ANTEP |
MUITO 1 +7 + V6 + ADJ + MASC + ANTEP |
NADA 1 +7 + V2 + NEG |
NO 1 +7 + V + PREP + MASC + PLUR |
NO MEA 1 +7 + V7 + VERB |
O 1 +7 + DET + MASC + PLUR |
OCULOS 1 +7 + V6 + COMM + MASC + PLUR |
OLHA 1 +7 + V5 + VERB |
OXALÁ 1 +7 + V1 + ADV + IMPS |
PARA 1 +7 + V3 + PRPP |
PAREDE 1 +7 + V6 + COMM - MASC + PLUR |
PARTIR 1 +7 + V4 + VERB |
PEDIR 1 +7 + V7 + VERB |
PERFIR 1 +7 + V7 + VERB |
PERGUNTA |+Z +V7 +VERB|,
PERMITIR |+Z +V7 +VERB|,
PETO |+Z +V2 +ADV|,
PODE |+Z +V7 +VERB|,
POR |+Z +V3 +PREP|,
PRETO |+Z +V1 +ADJ +MASC *PLUR|,
PROibir |+Z +V7 +VERB|,
PRÔMÊTE |+Z +V7 +VERB|,
QUANDO |+Z +V3 +PREP|,
RAPOZ |+Z +NP1 +HUM +MALE +MASC -PLUR|,
SABE |+Z +V7 +VERB|,
SEGURO |+Z +V1 +ADV +MENTE|,
SEM |+Z +V7 +ADVP|,
SENÃO |+Z +V7 +ADVP|,
SENTIR |+Z +V7 +VERB|,
SOFA |+Z +V6 +COMM +MASC *PLUR|,
SONHA COM |+Z +V7 +VERB +PREP|,
TELEVISÃO |+Z +NP1 +COMM -MASC *PLUR|,
TER |+Z +V10 +VERB|,
TOCA |+Z +V11 +VERB|,
TONTO |+Z +V6 +ADJ +NOM +MASC *PLUR|,
TRISTE |+Z +V +ADJ *PLUR|,
TU |+Z +N +PPON +PERS2 -PLUR|,
UM |+Z +DET +MASC *PLUR|,
UMA |+Z +DET -MASC *PLUR|,
VARIO |+Z +V6 +ADV +MASC *PLUR|,
VEMDE |+Z +V12 +VERB|,
VER |+Z +V10 +VERB|.

$ENDLEX

TRANSFORMATIONS

TRANS 0 LOWESTS III (#).
SD 15-+/<< S<# % #>??>, WHERE 1 DOM #.
"CYCLIC TRANSFORMATIONS"

TRANS 1 GER1 "GERONDIVIZATION I" I OP.
SD #<P<P<52 6F>7NP> E P<10F 11NP>>#, WHERE 7 EO 10.
SC ERASE 7, |+PPON| MERGEF 5.
TRANS 2 RECIP1 "RECIPROCATION1" OB AC.
SD #<P<P<F<52 6NP> 7NP> BE #<P<117 12NP> 13NP>>##,
WHERE 6 EO 13 & 7 EO 12 & 5 EO 11 & 5 INC1 [+RECIP].
SC ACHRE 6, 13 ACHRE 7, 8 ADIRS 6, 8ARISE 7, ERASE 9.
TRANS 3 GAP2 "GAPPING2" OP.
SD #<P<F<45<52 %> OU % 9F <10Z %>>##,
WHERE 4 NEO 9 & 5 EQ 10.
SC ERASE 10.
TRANS 4 GAP1 "GAPPING1" OP.
SD #<P<P<F<52 7NP> %>(E,OU) P<F<12Z 13NP>14NP>>##,
WHERE 6 EO 12 & 7 EO 13.
SC ERASE 12, ERASE 13, ERASE 14.
TRANS 5 SUBJR "SUBJECT RAISING" OB AC.
SD #<P<F<42 5P<F<2 %>9NP>1NP>##,
WHERE 4 INC1 [+COMP].
SC 9 ADIRS 5.
TRANS 6 ESD1 "EMBEDDED SUBJECT DELETION1" OB AC.
SD #<P<F<42 5P<F<7NP>(8NP) %>10NP>##,
WHERE 4 INC1 [+SUBDEL1] & 7 EO 8 | 10 EQ 7.
SC ERASE 9.
TRANS 7 ESD2 "EMBEDDED SUBJECT DELETION2" OB AC.
SD #<P<F<42 5NP> P<F<8NP>##,
WHERE 4 INC1 [+SUBDEL1] & 5 EO 8.
TRAN 24  TOPIC "TOPICALIZATION" OP.
SD #2P<3F<7 ((5NP<7) (6NP<7NP<7NP) 7NP>)#,
WHERE 7 EQ 3 | 7 EQ 5 | 7 EQ 6 | 7 EQ 8.
SC 7 ADCHL 2.
TRAN 25 PREP "PREPOSITION INSERTION" OB AC.
SD #4CF<7 (3NP)(6P)(NP) 7NP>8NP>#, 
WHERE 4 INC1 |+PREP|.
SC 7 MERGEF 5, 8 MERGEF 6.
TRAN 26 NEG2 "NEGATION2" OB AC.
SD #2P<4Z |+PREP| 5NP<7NP>#, 
WHERE 4 INC1 |+PREP| | 4 INC1 |+NEG| | 3 INC1 |+NEG| | 3 INC1 |+INTG|.
SC 7 MERGEF 5, 8 MERGEF 6.
TRAN 27 INCORP "INCORPORATION" OB AC.
SD #2P<3F<7 5NP<6NP>#, 
WHERE 3 INC1 |+INTG| 3 INC1 |+NEG| 3 INC1 |+INTG|.
SC 7 MERGEF 5, 8 MERGEF 6, 5 SUBSE 2.
TRAN 28 PASSIVE OP.
SD #P<3F<4Z (5NP)(NP) 8NP>#, 
WHERE (3 INC1 |+VERB| 3 INC1 |+VERB|
SC 7 MERGEF 8, 8 ADCHL 5, 5 SUBSE 8, |+VERB| ERASEF 4, ERASE 8.
TRAN 29 RECIP "RECIPROCATION" OP.
SD #P<4Z |+RECIP| 5NP 6NP >8NP>#, 
WHERE 5 EQ 8.
SC 6 ADCHL 8, 6 ADCHL 5, ADRS 8, ADRS 5.
TRAN 30 REFL "REFLEXIVIZATION" OB AC.
SD #P<3F<7 5NP<7 %> (3NP<7 %) >12NP>#,
WHERE 5 EQ 12 & 8 EQ 12.
SC 6 MERGEF 3, ERASEF 6.
TRAN 31 NAGREE "NOUN AGREEMENT" OB AC.
SD #P<3F<4Z 5NP<7 %
SC MOVEF 6 3, ERASEF 6.
TRAN 32 EINS "E-INSERTION" OB AC.
SD #P<3F<7 5NP<7 %>
SC MOVEF 6 4.
TRAN 33 REFL "REFLEXIVIZATION" OB AC.
SD #P<3F<7 5NP<7 %>
SC MOVEF 6 3, ERASEF 6.
"POST-CYCLIC TRANSFORMATIONS"
TRAN 35 ANTEP2 "ADJ OR PROPER NOUN ANTEPOSITION?" II OP.
SD % NP<37 % 5F <62>7%> 5F%, 
WHERE 6 INC1 |+ANTEP| | 6 INC1 |+DET|.
SC 6 SUBSE 3, 5 ADLS 3.
TRAN 36 IMP "IMPERATIVE" OP.
SD #P<3F<7 (4NP(5NP)) 7NP>
WHERE 3 INC1 |+NEG| 6 INC1 |+PERS2-VOCE|.
SC |+IMP| ERASEF 3, |+SUBJ| MERGEF 3, ERASE 5.
TRAN 37 INTERP2 "INTERROGATION2" OB AC.
SD #P<3F<7 (4NP (5NP)) 7NP>
WHERE 4 INC1 |+INTG| 5 INC1 |+INTG| 7 INC1 |+INTG|.
SC |+INTG| MERGEF 1.
TRAN 39 INTDEL "INTERROGATION DELETION" OB AC.
SD #P<3F<7 (4NP (5NP)) 7NP>
WHERE 4 INC1 |+INTG| 2 EQ 3.
SC ERASE 3.
TRAN 39 IMPER "IMPERSONALIZATION" OB AC.
SD #P<3F<7 (5NP)(NP) 8NP>
WHERE 5 NINC1 [+REFL] & 3 NDOM E.
SC [+REFL] MERGE E.
TRANS 40 SANTFP "SUBJECT ANTEPOSITION" OP.
SD 2P<% 3(NP,P) %>.
SC 3 AFIDE 1.
TRANS 41 ADVANT "ADVERB ANTEPOSITION" OP.
SD 1NP F<% 4F<Z %>% %>
SC 4 ALESE 1.
TRANS 42 QUANT "[+QU]-ANTEPOSITION" OB AC.
SD 2P<3NP<Z [+PREP] NP<NP [+QU] %>% %>
SC 3 ALESE 2.
TRANS 43 PRON2 "PRONOMINALIZATION2" OP.
SD P<NP<Z 4F %> %<NP<Z 9F %>
WHERE 4 EQ 9.
TRANS 44 CLIT1 "CLITIC1" OB AC.
SD 2F<3NP<Z /%% P F %>% 6NP<7Z /%% P F %>% %> %>,
WHERE 7 NINC1 [+PERS1] 7 NINC1 [+PERS2] 7 NINC1 [+REFL]
SC ERASE 6, 7 AFIDE 2.
TRANS 45 CLIT2 "CLITIC2" OP.
SD P<NP<Z %>% %>% %>
WHERE 4 INV1 [+IMP] 4 INV1 [+INF] 4 INV1 [+PROG].
SC 3 ARISE 4.
TRANS 46 PPIN2 "PREPOSITION INSERTION" OB AC.
SD 1P<2NP<Z %>% %>,
WHERE 3 INC1 [+PREP].
SC 1 ADFID 2, [+PREP] ERASEF 3.
TRANS 47 QUIN "+QUE|-INSERTION" OB AC.
SD 32P %>
WHERE 2 INC1 [+QUE].
TRANS 48 NA0IN "NA0-INSERTION" OB AC.
SD P<2NP 3F<% 5Z %>% %>,
WHERE 5 NINC1 [+NEG] & 2 DOM [+NEG].
SC NA0 ADFID 3, [+NEG] ERASEF 5.
TRANS 49 SPROEL "SUBJECT PRONOUN DELETION" OP.
SD P<1Z>NP<32F%(5NP<6Z>) %>
WHERE 3 NINC1 [+REFL] 3 NINC1 [+NEG] 3 NINC1 [+INTG] 6 NINC1 [+INTG].
SC ERASE 2, ERASE 5.
TRANS 50 DETDEL "DETERMINER DELETION" OP.
SD % NP<% 4Z F<6Z %> %>
WHERE 6 INC1 [+NPROP].
SC ERASE 4.
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| NODE 9 Z           |
| [ +Z -PLUR +MASC +DET ] |

| NODE 16 Z          |
| [ +Z -PLUR +MASC *ANIM +COMM +<N<>_ > ] |

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**NODE 6 BARBEA**

1 +PRESI

**NODE 9 Z**

1 +Z +PLUR +MASC +DET

**NODE 16 Z**

1 +Z +PLUR +MASC +DET

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| SCAN CALLED AT | 10 TREE |
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Transformation 36 ANTEST2 Not Applied at Node 1 BY REASON OF OPTIONALITY

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| NODE 7 VE         |
| +PRESI            |

| NODE 27 CORRE     |
| +PRESI            |

#VE A MARIA AS CRIANCAS E CORRE AS CRIANCAS#
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Change: Call ELEMOP For ERASE

Scan Called At

Node
VE' A MARIA AS CRIANCAS E CORRE AS CRIANCAS
| SCAN CALLED AT | 11 | ANTEST CALLED FOR | 1"LOWESTS " (AC ) | SD = 19. RESTRICTION = 1. TOP = 1:5 |
| SCAN CALLED AT | 12 | ANTEST CALLED FOR | 1"LOWESTS " (AC ) | SD = 19. RESTRICTION = 1. TOP = 4:5 |
| SCAN CALLED AT | 13 | ANTEST CALLED FOR | 1"LOWESTS " (AC ) | SD = 19. RESTRICTION = 1. TOP = 24:5 |

| TRANSFORMATION | 36 | ANTEP2 | NOT APPLIED AT NODE 24 BY REASON OF OPTIONALITY |
| TRANSFORMATION | 37 | IMP | NOT APPLIED AT NODE 4 BY REASON OF OPTIONALITY |

| ANTEST CALLED FOR | 36"ANTEP2 " (AC ) | SD = 54. RESTRICTION = 27. TOP = 1:5 |
| ANTEST CALLED FOR | 38"INTER2 " (AC ) | SD = 56. RESTRICTION = 29. TOP = 1:5 |
| ANTEST CALLED FOR | 39"INTDEL " (AC ) | SD = 57. RESTRICTION = 30. TOP = 1:5 |
| ANTEST CALLED FOR | 39"INTDEL " (AC ) | SD = 57. RESTRICTION = 30. TOP = 4:5 |
| ANTEST CALLED FOR | 40"IMPER " (AC ) | SD = 58. RESTRICTION = 31. TOP = 1:5 |
| ANTEST CALLED FOR | 40"IMPER " (AC ) | SD = 58. RESTRICTION = 31. TOP = 4:5 |

| ANTEST CALLED FOR | 40"IMPER " (AC ) | SD = 58. RESTRICTION = 31. TOP = 24:5 |
| ANTEST CALLED FOR | 41"SANTEP " (AC ) | SD = 59. RESTRICTION = 0. TOP = 1:5 |
| ANTEST CALLED FOR | 41"SANTEP " (AC ) | SD = 59. RESTRICTION = 0. TOP = 24:5 |

| TRANSFORMATION | 42 | ADVANT | NOT APPLIED AT NODE 1 BY REASON OF OPTIONALITY |
| TRANSFORMATION | 42 | ADVANT | NOT APPLIED AT NODE 4 BY REASON OF OPTIONALITY |

| ANTEST CALLED FOR | 42"ADVANT " (AC ) | SD = 60. RESTRICTION = 0. TOP = 24:5 |
| ANTEST CALLED FOR | 43"QUANT " (AC ) | SD = 61. RESTRICTION = 0. TOP = 1:5 |
| ANTEST CALLED FOR | 43"QUANT " (AC ) | SD = 61. RESTRICTION = 0. TOP = 4:5 |

<p>| ANTEST CALLED FOR | 44&quot;PRCN2 &quot; (AC ) | SD = 61. RESTRICTION = 0. TOP = 24:5 |
| ANTEST CALLED FOR | 45&quot;CLITI &quot; (AC ) | SD = 62. RESTRICTION = 32. TOP = 1:5 |
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12 N 13 Z 14 MARIA
15 NP 16 D 17 Z 18 AS
19 N 20 Z 21 CRIANÇAS

22 K 23 E
24 S 25 F 26 Z 27 CORRE
28 NP 29 D 30 Z 31 AS
32 N 33 Z 34 CRIANÇAS

NODE 7 VE
[+PRES]

NODE 10 Z
[+Z +PLUR -MASC +DET]

NODE 27 CORRE
[+PRES]

VE A MARIA AS CRIANÇAS E CORRE AS CRIANÇAS

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SCAN CALLED AT: 14

TRANSFORMATIONS WHICH HAVE APPLIED ARE:

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| 2 | 35 | B/DEL |</p>
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<td>17 Z</td>
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NODE 7 TER

NODE 20 Z

NODE 17 Z

NODE 25 TOCA

NODE 28 Z

TER O RAPAZ UMA FLAUTA TOCA UMA FLAUTA

S<#P<CF<Z<VENDE |+PRES +REFL|>>NP<#N<Z<CARROS>>>>#>. "S5"
ANTEST CALLED FOR "EINS" (AC) SD= 51. RESTRICTION= 26. TOP= 1:S
ANTEST RETURNS 1

CHANGE. PREPARE FOR ACHLE 12 4
ANTEST CALLED FOR "EAGRE" (AC) SD= 52. RESTRICTION= 0. TOP= 1:S

ANTEST CALLED FOR "BDEL" (AC) SD= 53. RESTRICTION= 0. TOP= 1:S
ANTEST RETURNS 1

CHANGE. CALL ELEMOP FOR ERASE 0 2
CHANGE. CALL ELEMOP FOR ERASE 0 11

SCAN CALLED AT 9

SCAN CALLED AT 10 •TREE

TREE READ BY FTRIN
1 S 3 P 13 F 12 E

7 NP 4 F 5 Z 6 VENDE
8 N 9 Z 10 CARROS

NODE 6 VENDE [+PRES +REFL]
E VENDE CARROS
Scan called at 11 >
Antest called for 1"lowestS "(AC) SD = 19. Restriction = 1. Top = 1:S
Scan called at 12 :
Antest called for 36"anteP2 "(AC) SD = 54. Restriction = 27. Top = 1:S
Antest called for 37"imp "(AC) SD = 55. Restriction = 28. Top = 1:S
Antest called for 38"inter2 "(AC) SD = 56. Restriction = 29. Top = 1:S
Antest called for 39"inTdel "(AC) SD = 57. Restriction = 30. Top = 1:S
Antest called for 40"imP "(AC) SD = 58. Restriction = 31. Top = 1:S

Transformation 41 SanTeP Not applied at node 1 by reason of optionality
Antest called for 42"advant "(AC) SD = 60. Restriction = 32. Top = 1:S
Antest called for 43"quant "(AC) SD = 61. Restriction = 33. Top = 1:S
Antest called for 44"pron2 "(AC) SD = 62. Restriction = 34. Top = 1:S
Antest called for 45"cliT1 "(AC) SD = 63. Restriction = 35. Top = 1:S
Transformation 45cliT2 Not applied at node 1 by reason of optionality
Antest called for 47"prin2 "(AC) SD = 65. Restriction = 36. Top = 1:S
Antest called for 48"quIn "(AC) SD = 66. Restriction = 37. Top = 1:S
Antest called for 49"naoin "(AC) SD = 67. Restriction = 38. Top = 1:S

Transformation 50 SPrdel Not applied at node 1 by reason of optionality
Antest called for 51"deTdel "(AC) SD = 69. Restriction = 39. Top = 1:S

Scan called at 14

Transformations which have applied are

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TREE READ BY FTRIN

1  S  3  P  13  F  12  E  4  F  5  Z  6  VENDE

7  NP  8  N  9  Z  10  CARROS

NODE  '6  VENDE
|+PRES  +REFL|

E  VENDE  CARROS

S<#P<F<Z<VE  |+PRES  +NEG|>>NP<D<Z<D>>N<Z<DOENTE>>NP<N<Z<TELEVISAO>>>
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"2S6"
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<td>[+Z +PLUR +MASC +DET]</td>
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#VE 'O DOENTE TELEVISÃO#
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Scan Called At 9
Scan Called At 10 TREE

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TREE Read by FTRIN
1 IS 3 P 20 F 19 E

7 Np 8 G 9 Z 10 N 11 N 12 Z 13 O

Node 6 VE [+NEG +PREL]
Node 9 Z [+Z +PLUR +MASC +DET]
F VE O DOENTE TELEVISAO
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Transformations which have applied are:

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2 33 EINS
3 35 BDEL
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**NODE 6 VE**

| +NEG +PRES |

**NODE 9 Z**

| +Z +PLUR +MASC +DET |

E VE O DOENTE TELEVISION

STOP

EXECUTION TERMINATED

$SIG
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