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Worksheets for a first course in transformational syntax

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SIL-UND

TO BE LISTED
BY JUNE MORRIS

WORKSHEETS

FOR A FIRST COURSE IN TRANSFORMATIONAL SYNTAX

Austin Hale

A Supplement to the 1965 WORK PAPERS
of the (Vol.
Summer Institute of Linguistics
University of North Dakota
Grand Forks, North Dakota

The worksheets collected here were written in answer to a need for short exercises that could be easily worked in class and that would illustrate and allow for the application of material presented to the Area Linguistics course of the Summer Institute of Linguistics held at the University of North Dakota during the summer of 1965. With the exception of the introductory worksheets, which were designed to provide a bridge for the approach of transformational syntax by students who had some acquaintance with the Tagmemic view of grammar, these materials were intended as pedagogical aids for the presentation of Transformational Syntax as revised by Chomsky in Aspects of the Theory of Syntax, Cambridge, Massachusetts, 1965.

The writer wishes to express his appreciation to Professor R. B. Lees for his initial exposure to things transformational, to Dr. Richard S. Pittman for encouragement in the development and use of these exercises, to Dr. C. Henry Bradley and Alan Pence for many hours of stimulating discussion, and to Kenneth Maryott, editor of the 1965 WORK PAPERS for his cooperation and help in matters of format.

August, 1965 A. H.
Grand Forks, North Dakota

C O N T E N T S

PRACTICAL EXERCISES

These exercises performed two functions. They provided the students with an immediate opportunity for applying the material presented in each lecture and they provided the teacher with a way of determining the points at which the students were in need of further help. Each instructional period was divided into two parts: (1) the presentation of materials by the instructor and (2) the working of practical exercises relevant to these materials by the students.

This collection of worksheets is thus divided into two parts: (1) the practical exercises included in this section and (2) the illustrative materials in the section that follows. Of the two parts, the practical exercises are considered more important and thus are placed first.

AREA LINGUISTICS: PRACTICAL EXERCISE # 1

1. Using the symbols given below, write word, phrase and clause level formulae for the following English sentences.

   a. Mary went to the park.

   b. Sally played in the street.

   c. The girl goes to the park regularly.

   d. The little girl played in the big park.

   e. The big girl went there repeatedly.

Clause-Level Slots		Clause-Level Fillers	
S	subject	np	proper noun
P	predicate	vi	intransitive verb
Loc	locative	Lra	locative relator-axis phrase
Man	manner	Mra	manner relator-axis phrase

Phrase-Level Slots		Phrase-Level Fillers	
R	relator	prep	preposition
A	axis	Nc	count-noun phrase
Lim	limiter	ar	article
H	head	nc	count noun
M	modifier	aj	adjective

Word-Level Slots		Word-Level Fillers	
vnuc	verb nucleus	vs	verb stem
tns	tense	pst	past
mnuc	manner nucleus	prs	present
maf	manner affix	ajs	adjective stem
		maf	manner affix

2. Pick one of the five sentences given above and supply it with a structural description in terms of a labeled bracket (i.e., P-marker, tree, dendridic representation, etc.) which incorporates the tagmemic formulae that you have written for that sentence.

3. Adding the slot: $\underline{\text{O}}$ (object) and the filler: $\underline{\text{vt}}$ (transitive verb), write formulae and construct labeled brackets for each of the following sentences:

   f. John enjoyed the play tremendously.

   g. Bill eats peas in a peculiar manner.

   h. Bob reads books on linguistics with gusto.

   i. Peter has a wild imagination.

AREA LINGUISTICS: PRACTICAL EXERCISE # 2

1. Give two simple sentences that might underly each of the complex sentences below.

2. For each of the complex sentences show one case of multiple syntactic relations.

3. For each of the simple sentences you have furnished in answer to requirement (1) above, give tagmemic formulae at WORD, PHRASE, and CLAUSE levels.

4. Supply a labeled bracket for each sentence for which you write tagmemic formulae.

SENTENCES:

a. They asked me to come

b. They saw him running.

c. He went away sad.

d. He painted the fence white.

e. He wished to be ignored.

f. I plead with him to stay away.

g. He refrained from pulling my hair.

h. For him to come was unusual.

i. John has always been eager to please.

j. The fish is ready to eat. (He hasn't been fed for two days.)

k. The fish is ready to eat. (It has been in the oven for an hour.)

l. Paul hates visiting relatives.

m. Joe can't stand May's cooking. (She makes too much noise in the kitchen.)

n. May can't stand Joe's cooking. (It tastes awful.)

o. The Russians are delightful to visit.

p. The Russians are delighted to visit.

q. They advised him to take the train.

AREA LINGUISTICS: PRACTICAL EXERCISE # 3

1. Identify the clause-level units in the following sentences which function as

   a. Nouns
   b. Verbal Complements
   c. Adjectives
   d. Adverbs

2. Give simple sentences which you consider to be plausible sources for these "clause-level" constructions.

   a. It was too hot for him to eat. (Adv)

   b. I saw the man standing on the corner reading a newspaper.

   c. I watched him as he ate his Cherios.

   d. Dogs that bark don't bite.

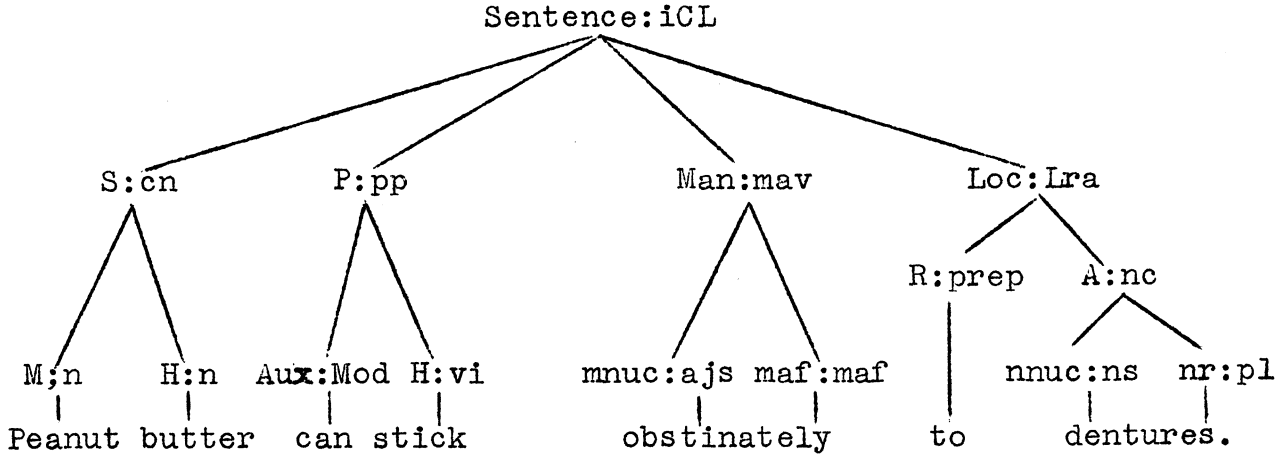
   e. Happiness is feeling the wind and rain in your hair. (Peanuts)

   f. I admit I've been bad. (Peanuts)

   g. He said that he found it.

   h. How do you expect anyone to find a ball in weeds like these? (Peanuts)

3. Write the phrase-structure expansion rules that generate the following tree:



AREA LINGUISTICS: PRACTICAL EXERCISE # 4

1. Using the following symbols to label nodes in the tree, construct trees to mark the constituent structure of the sentences given below. Invent additional labels if such are needed.

S	Sentence	Time	Time Adverb
NP	Noun Phrase	Prep	Preposition
VP	Verb Phrase	Det	Determiner
V	Verb	Pron	Pronoun
N	Noun	Aj	Adjective
Man	Manner Adverb	Av	Adverb
Loc	Place Adverb	PP	Predicate Phrase
M	Modal Verb	Prep Phr	Prepositional Phrase

2. Write Phrase Structure Expansion Rules that will generate these trees.

3. Be able to say exactly how the relations of Subject-to-Sentence, Direct Object-to-Verb Phrase, and Main Verb-to-Verb Phrase are expressed by the trees your rules generate.

   a. Sincerety may frighten the boy.

   b. Joe slept soundly in the corner.

   c. Paul hit the fence in left field.

   d. John missed the train today.

   e. Lucy buried the blanket.

   f. The blanket belonged to Linus.

   g. Linus was unhappy.

   h. Snoopy found the blanket.

   i. Snoopy brought the blanket to Linus.

   j. This pleased Linus.

   k. At times like these, Snoopy feels that his existence is justified.

AREA LINGUISTICS: PRACTICAL EXERCISE # 5

1. Using the following symbols to label nodes in the tree, construct trees to mark the underlying constituent structure of the sentences given below. Invent additional labels if such are needed.

S	Sentence
NP	Noun Phrase
PP	Predicate Phrase
VP	Verb Phrase
IO	Indirect Object
N	Noun
V	Verb
Det	Determiner
Prep	Preposition

2. Write Phrase Structure Expansion Rules that will generate these trees.

3. Be able to say how the relations of Subject-to-Sentence, Direct Object-to-Verb Phrase, and Main Verb-to-Verb Phrase are expressed by the trees that your rules generate.

4. Support your trees in terms of examples that tend to show that each of the categories you have included in VP sub-categorizes the category of verbs in English.

a. John could offer some advice to you.

b. I can fly this kite. (Peanuts)

AREA LINGUISTICS: PRACTICAL EXERCISE # 6

1. Construct trees for the following sentences.
2. Write the permutation rules required to change an underlying tree into the desired derived tree.
3. Write the Phrase Structure Rules needed for the generation of the underlying trees.

a. (Underlying) A brick came through the window.

(Derived) Through the window came a brick.

b. (Underlying) A book lay on the floor.

(Derived) On the floor lay a book.

c. (Underlying) A left-handed screwdriver was fastened to the wall.

(Derived-1) To the wall a left-handed screwdriver was fastened.

(Derived-2) To the wall was fastened a left-handed screwdriver.

d. (Underlying) A garden hose was suspended from the rafters.

(Derived-1) From the rafters a garden hose was suspended.

(Derived-2) From the rafters was suspended a garden hose.

e. (Underlying) A Roman Candly sped past his head.

(Derived-1) Past his head, a Roman Candle sped.

(Derived-2) Past his head sped a Roman Candle.

f. (Underlying) John looked up her phone number.

(Derived) John looked her phone number up.

g. (Underlying) John took away his can of crack plaster.

(Derived) John took his can of crack plaster away.

AREA LINGUISTICS: PRACTICAL EXERCISE # 7

1. Show how the following two sentences differ in terms of the permutability of their constituents.

2. Using the following symbols, construct trees that reflect these differences. Invent additional symbols where needed.

S	Sentence	N	Noun
VP	Verb Phrase	Det	Determiner
NP	Noun Phrase	Dir	Directional adverb
V	Verb	Prt	Particle

3. Account for any ambiguity that you may discover by giving two derivations.

4. Write Phrase Structure Expansion Rules to generate the underlying trees you have constructed.

5. Write a permutation rule that will give the allowed permutations but that will not give the disallowed permutations.

   a. He looked up the data.

   b. He looked up the street.

6. Follow the instructions given above for each of the following pairs of sentences:

   a. He climbed up the tree.

   b. He rang up the sale.

   a. He held out his hand.

   b. He went out the door.

   a. He thought over the scheme.

   b. He went over the hill.

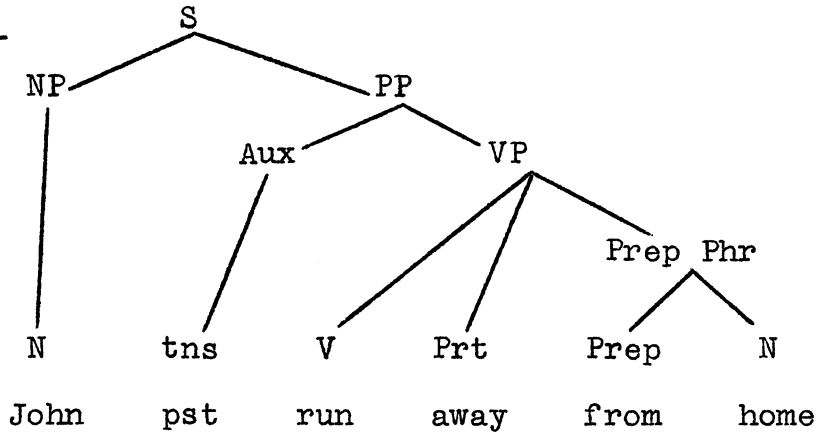
   a. The Russians are delighted to visit.

   b. The Russians are delightful to visit.

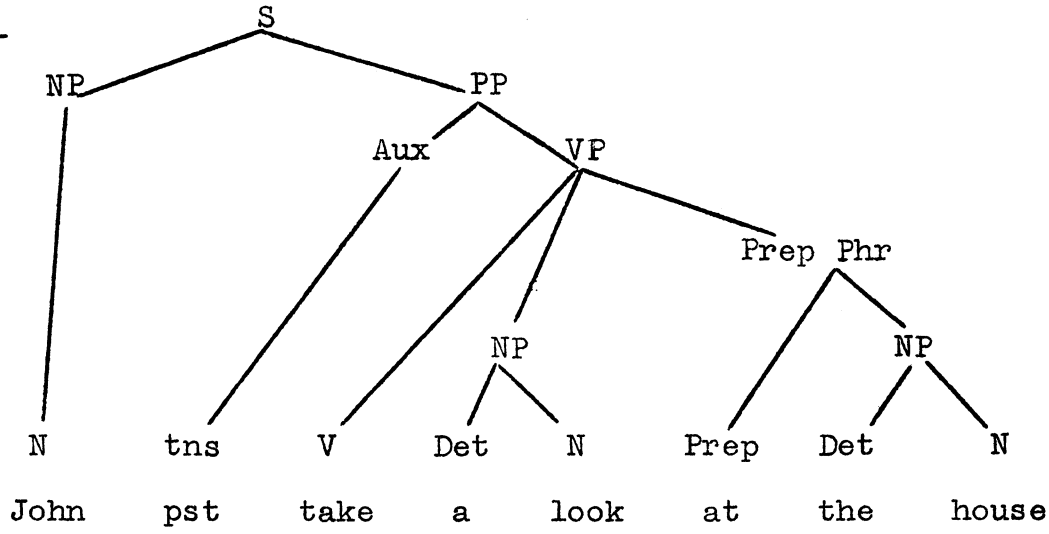
AREA LINGUISTICS: PRACTICAL EXERCISE # 8

1. Give ten (10) possible structural indices for each of the following trees:

Tree A:



Tree B:



2. What indices for tree A also are indices for tree B?

3. From your observations in working this exercise, which of the following two kinds of indices is the more general, i.e., which kind applies to a wider range of trees:

   a. Indices consisting of high-level nodes in a tree (NP, PP).

   b. Indices consisting of low-level nodes in a tree (pst, V).

4. Which of the following kinds of indices is the more general?

   a. Indices with many formatives (NP, V) and few variables (X, Y).

   b. Indices with few formatives and many variables.

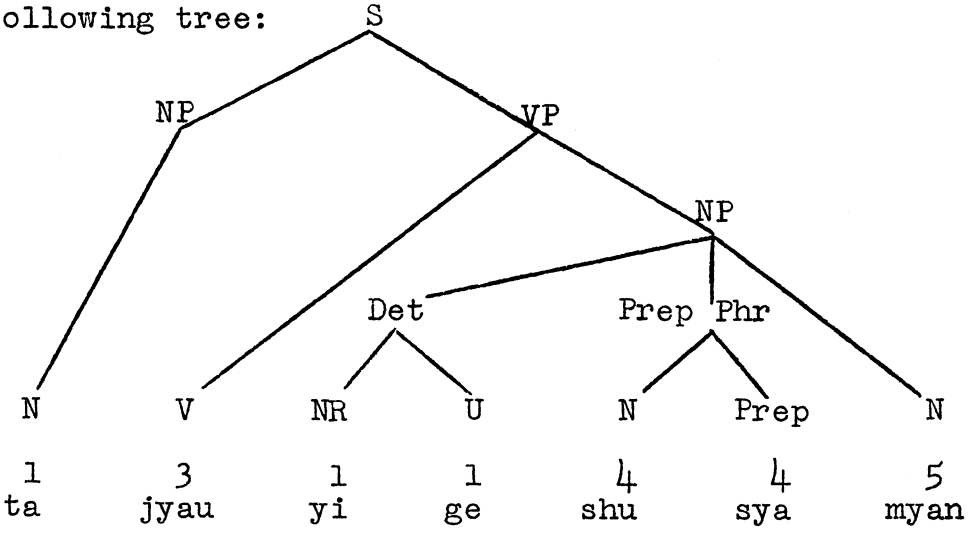
AREA LINGUISTICS: PRACTICAL EXERCISE # 9

1. (10 Points) Given the following definitions:

/$\overline{\text{NP}}$, S/ = Subject of S
/$\overline{\text{V}}$, VP/ = Main Verb of VP
/$\overline{\text{NP}}$, VP/ = Direct Object of VP

and the following tree:

Tree A:



fill in the blanks below with the words from the sentence above which function as:

Subject of S:_____

Main Verb of VP:_____

Direct Object of VP:_____

/$\overline{\text{N}}$, Prep Phr/:_____

/$\overline{\text{NR}}$, Det/:_____

fill in the blanks below with all the words and phrases which are (i.e., are dominated by):

N:_____

V:_____

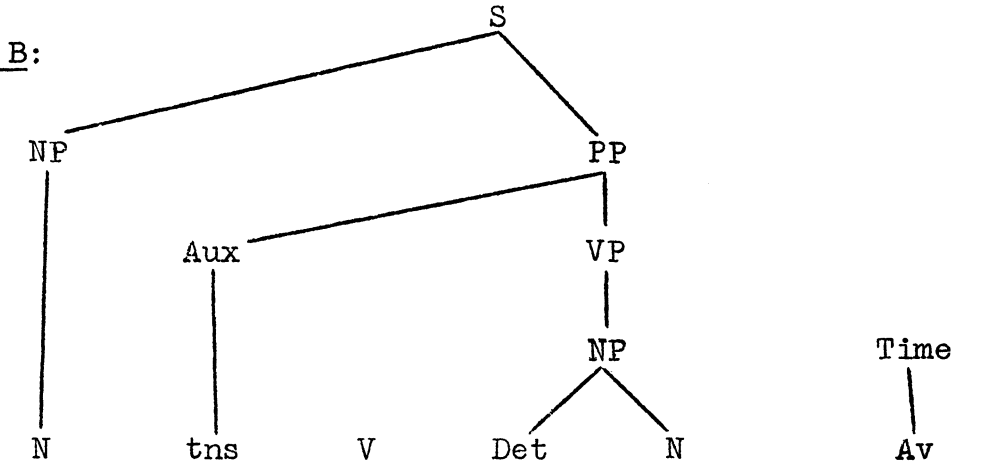
Prep Phr:_____

Det:_____

NP:_____

2. (2 Points) Complete the following tree so as to reflect the subcategorization relationships that obtain among the constituents of this sentence:

Tree B:



3. (10 Points) Give ten (10) structural indices drawn from the completed tree B in question (2) above.

_____ _____

_____ _____

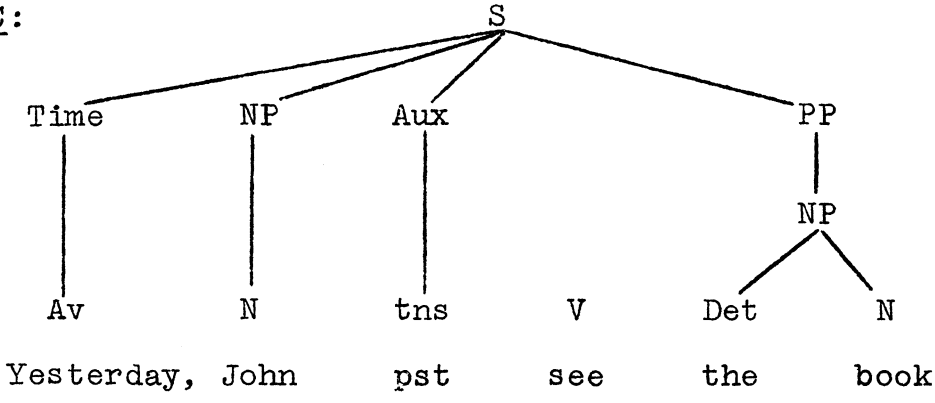
_____ _____

_____ _____

_____ _____

4. (8 Points) Complete the following tree and give the permutation transformation required to derive tree C (below) from tree B (in (2) above).

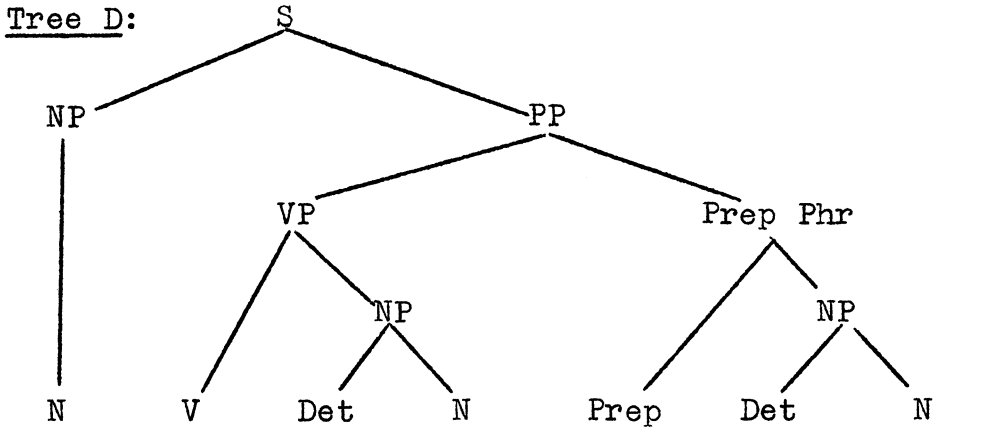
Tree C:



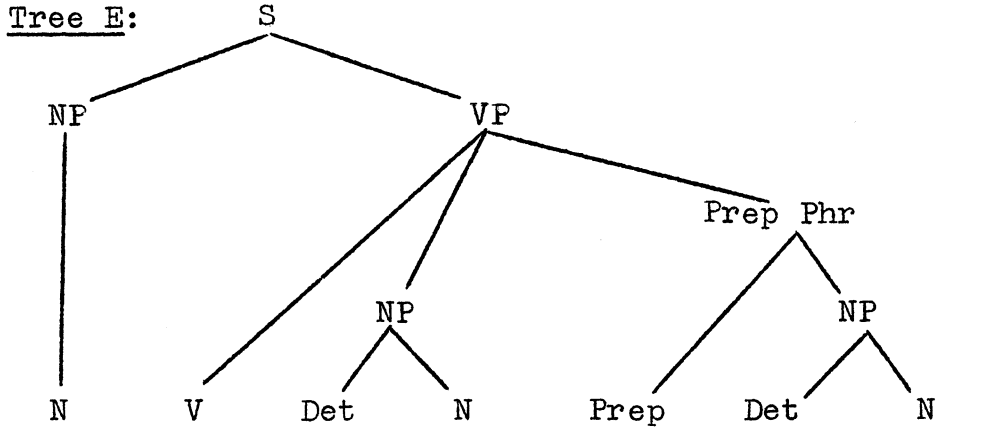
Permutation: _____

5. (5 Points) Given the following trees:

Tree D:



Tree E:



Pick the tree which is supported by the evidence presented in the following sentences: (* marks ungrammatical sentences)

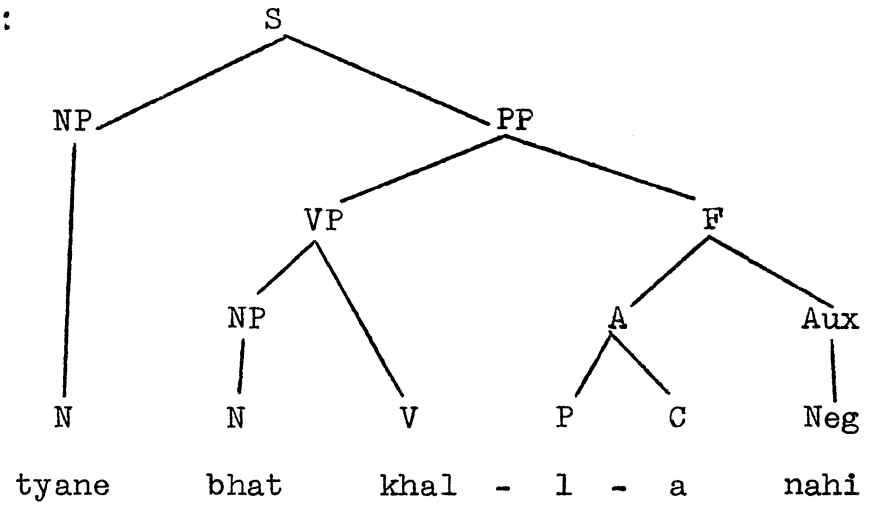
a. John eased his foot into his mouth.
b. *John kept his foot into his mouth.
c. *John slit his foot into his mouth.
d. *John ate his foot into his mouth.

Circle the correct answer: Tree D

Tree E

6. (7 Points) Give the Phrase Structure Expansion Rules required for the generation of the following tree:

Tree F:



_____ _____

_____ _____

_____ _____

_____

7. (5 Points) Match the items on the right with their descriptions on the left by placing the appropriate letters in the blanks on the left. Use one letter per blank. No letter is used twice.

___ 1. Phrase Structure Expansion Rule in which the expanded category has an optional constituent.

___ 2. Definition explicating a syntactic relation marked by an underlying tree in deep structure.

___ 3. Permutation Rule.

___ 4. Structure Index.

___ 5. Phrase Structure Expansion Rule in which a category may be expanded in two alternative, mutually exclusive ways.

a. X + Det + N + Y

b. Loc --> { Av / Prep Phr }

c. NP --> (Det) N

d. X + Aff + V + Y
--> X + V + Aff + Y

e. X + Det + N + Y
--> X + N + Y

f. /N , NP/

8. (8 Points) Apply the following Phrase Structure Expansion Rules to construct a tree.

S --> NP + PP

PP --> Aux + VP (Time) (Place)

Aux--> Tns (M)

VP --> V (NP) (IO)

NP --> (Det) N

Time-> Av

Place-> Av

Tns--> {pst / prs}

9. (5 Points) Write a rule which permutes the Time adverb in the tree you constructed for question (8) above to sentence-initial position.

Permutation Rule:_____

10. (5 Points) Give the tree which results from the application of your rule in (9) above to your tree in (8) above:

11. (5 Points) Define for your tree in (8) above, the following grammatical relations:

_____ Subject of S _____ Head of NP

_____ Main Verb of VP _____ Aux of PP

12. (15 Points) Multiple choice: For each statement, circle the letter to the left of the response which best completes the statement.

1. On the Tagmemic view, language is to be studied as one kind of human _____. (i.e., language is a kind of human ___)

    a. Capability
    b. Behavior
    c. Theory

2. _____ are of primary concern to Transformationalists.

    a. Units
    b. Polemics
    c. Relations

3. On the Tagmemic view, relations are considered to be features of _____.

    a. Units
    b. Trees
    c. Rules

4. A rule which gives a structural index or description defining the set of trees to which it applies and a structural change which those trees are to undergo is a _____.

    a. Lexical Rule
    b. Phrase Structure Expansion Rule
    c. Transformation

5. For the Tagmemicist, language is a system consisting of _____.

    a. Three interlocking but semi-autonomous hierarchies.
    b. A generative source and two interpretative components.
    c. Contrast, Variation, and Distribution.

6. On the Tagmemic view, units are defined in terms of _____.

    a. The linguistic intuitions of informants
    b. Recursive rules
    c. Contrast, Variation, and Distribution

7. The relationships among the constituents of a sentence are, on the Transformational view, best represented by means of ___.

    a. Slot labels
    b. The underlying tree
    c. Substitution sets

8. Deep Structure is mapped onto surface structure by means of _____.

    a. Lexical rules
    b. Phonological rules
    c. Transformational rules

9. The phonological component of a transformational grammar requires _____ as its input.

    a. Surface structure
    b. Occurrence formulae
    c. Phrase structure rules

10. On the transformational view, the subcategorization of syntactic categories (such as N, V, ...) is effected by means of _____.

    a. Permutation rules
    b. The semantic component
    c. The "frames" defined by the underlying tree

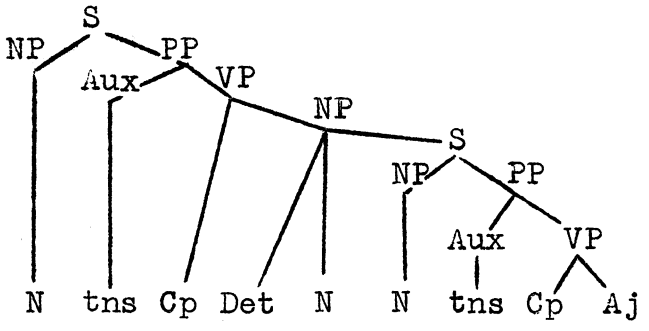
13. (15 Points) In about one hundred words, distinguish clearly between Phrase Structure Expansion Rules and Transformational Rules.

AREA LINGUISTICS: PRACTICAL EXERCISE # 10

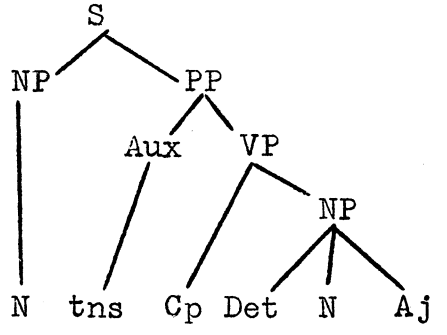
1. Construct trees for each of the sentences in the following triplets.

2. Write a deletion rule that derives the second tree of each triplet from the first.

3. Write a permutation rule that derives the third tree of each triplet from the second.



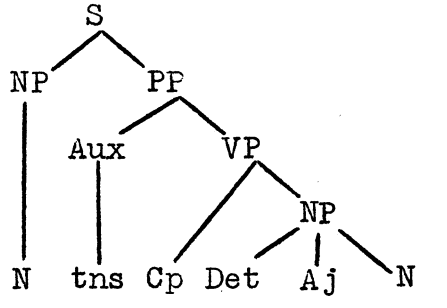
Don prs be a man who prs be big



Don prs be a man big

Rule: _____

Rule: _____



Don prs be a big man

The snake is an animal which is very repulsive.

The snake is an animal very repulsive.

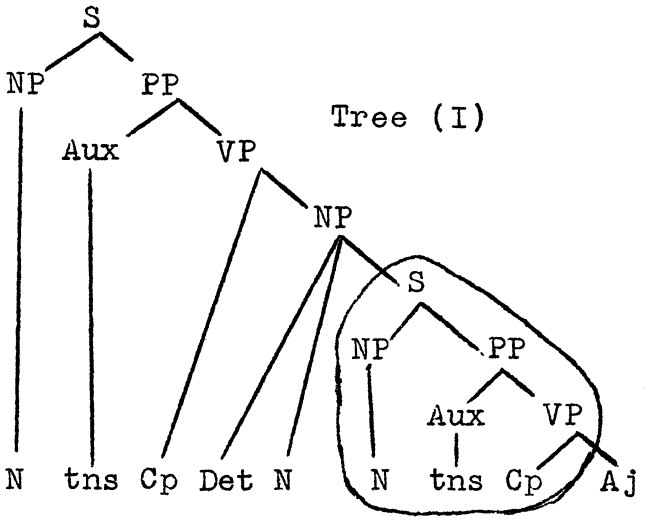
The snake is a very repulsive animal.

4. Revise your trees and your rules as necessary in order to distinguish between nominal modifiers that permute and those that do not.

Joe is the character who is playing the piano.
Joe is the character playing the piano.
Joe is the playing the piano character.

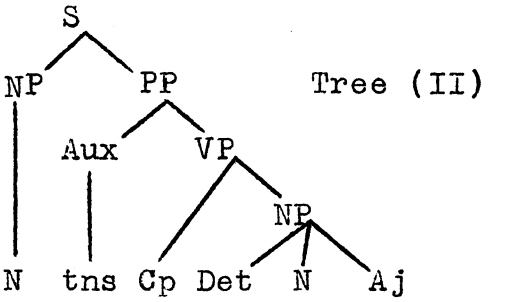
Bill is the plumber who is working hard. (hard-working)
Bill is the plumber working hard. (hard-working)
Bill is the working hard plumber. (hard-working)

A Discussion of some Answers to Practical Exercise # 10



Tree (I)

The difference between trees (I) and (II) is that the circled portion of (I) is missing in (II). Thus we may say that (I) is related to (II) by means of a deletion rule. The constraint that deleted items be uniquely reconstructable would indicate that the tns of the relative clause must agree with the tns of the main clause. This can also be supported in terms of the requirement that optional transformations link only paraphrases, thus the sentence, Don is a big man. is not a paraphrase of the sentence, Don is a man who was big. , but rather it is a paraphrase of Don is a man who is big.



Tree (II)

The structural description of the deletion rule which relates (I) and (II) must mention all the constituents that are relevant to that relationship. That is, the structural description must mention both those elements that are to be deleted and those elements involved in the conditions for the application of the rule. Thus it will be necessary in the structural description to mention both the tns of the main and relative clauses, since their agreement is relevant to the conditions for the application of the rule, and it will also be necessary to to mention certain of the elements of (I) which are encircled. The evidence discussed here tends to support a rule like the following:

Relative Clause Reduction Rule: (Optional)

SD: X , tns , Y , who , tns , Cp , Y
1 2 3 4 5 6 7

SC: 1 2 3 7

Conditions: 2 = 5

Several things should be noted here:

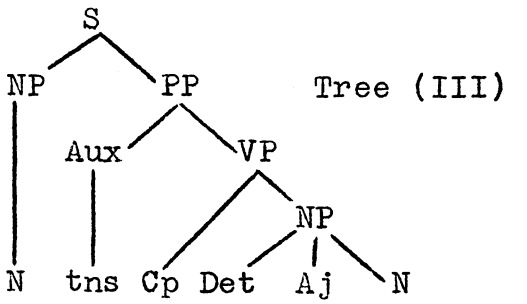
1. Since (I) underlies a perfectly good sentence, Don is a man who is big., the rule above must be optional in its application.

2. The terminal symbol, who, in the rule above will have to be generalized to something like WH + Det + N so as to apply in cases where that and which occur.

3. Elements in Y will have to be specified since some sentences of the form specified do not reduce: There is the stone which is never replaced. That is to say that Y probably cannot simply be any string.

4. As it stands, this rule correctly predicts that sentences like John is the mechanic who works at Huey's., and T.S. is an individual who often gets spanked. will not reduce to, *John is the mechanic works at Huey's., and *T.S. is an individual often gets spanked., respectively.

The difference between trees (II) and (III) is the order of Aj and N within VP. Thus we may say that (II) is related to (III) by means of a permutation rule. Furthermore, since (II) underlies the unacceptable sequence, *Don is a man big., the rule that permutes Aj to prenominal position is obligatory. The rule may be stated as follows:



Tree (III)

Adjective Move Rule: (Obligatory)

SD: X , N , Aj , Y
1 2 3 4

SC: 1 3 2 4

Condition: N and Aj are immediately dominated by NP.

Note now that while the rule which relates (I) and (II) is optional and the rule which relates (II) and (III) is obligatory, this latter rule correctly fails to apply to trees to which the preceding rule has not applied. The reader is encouraged to state for himself exactly why this is the case. It should also noted, however, that the adjective move rule will not make the necessary distinctions between adjectives which permute and those which do not. This refinement is left to the reader to make.

AREA LINGUISTICS: PRACTICAL EXERCISE # 11

1. Convert each of the following rules into a notation utilizing commas instead of braces:

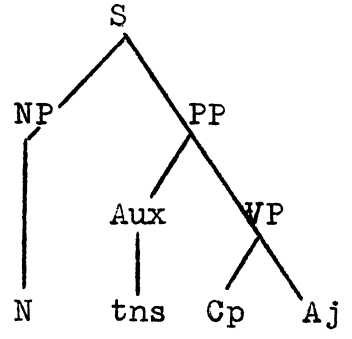
SD: $\underbrace{\#\ X}_{1} + \underbrace{Det + N}_{2} + \underbrace{WH + Det + N + C}_{3} + \underbrace{Y\ \#}_{4}$ SC: 1 3

SD: _____ SC: 1 3

SD: $\underbrace{\#\ U}_{1} + \underbrace{Det + N}_{2}\ \#\ X + \underbrace{Det + N}_{5} + Y\ \#\ \underbrace{Z\ \#}_{8}$ SC: 1 2 WH 4 5 6 8

SD: _____ SC: 12WH4568

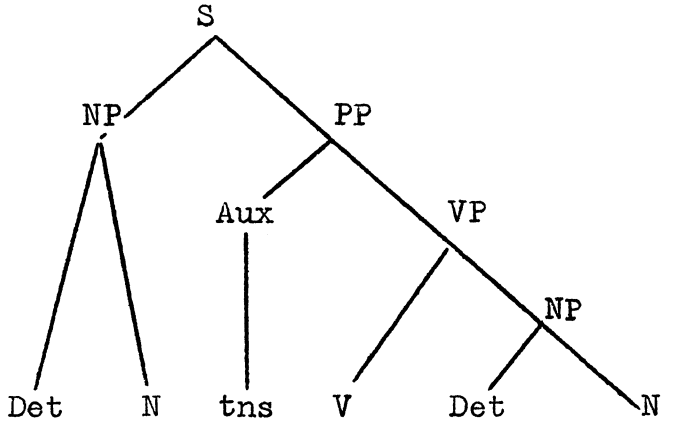
2. Convert each of the following trees into a notation utilizing labeled brackets:



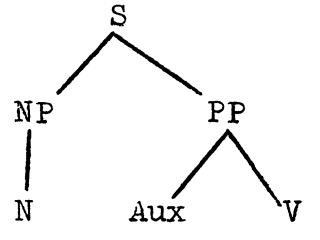
John pst be tall

_____

_____



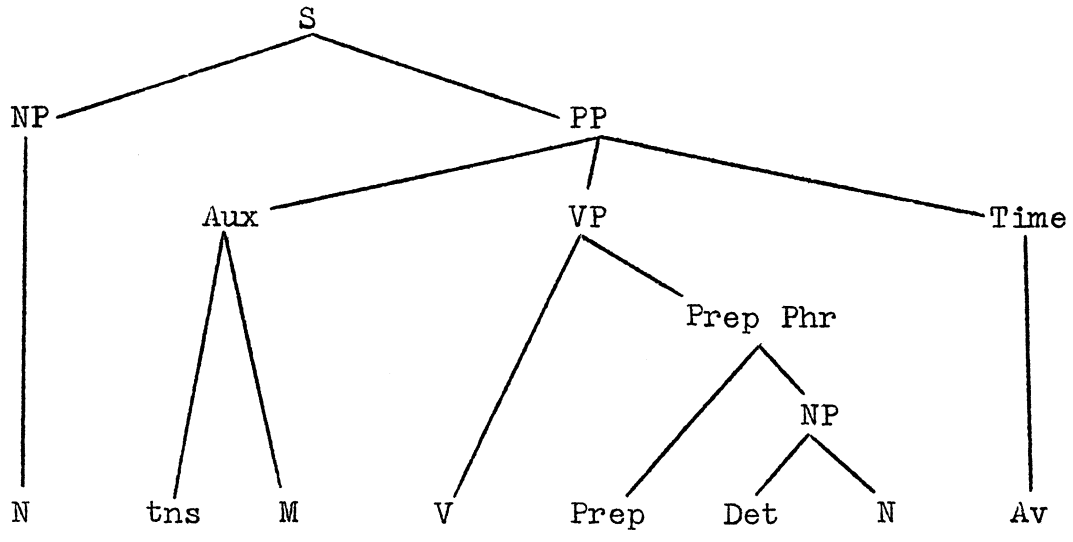
The train prs make a lot of noise



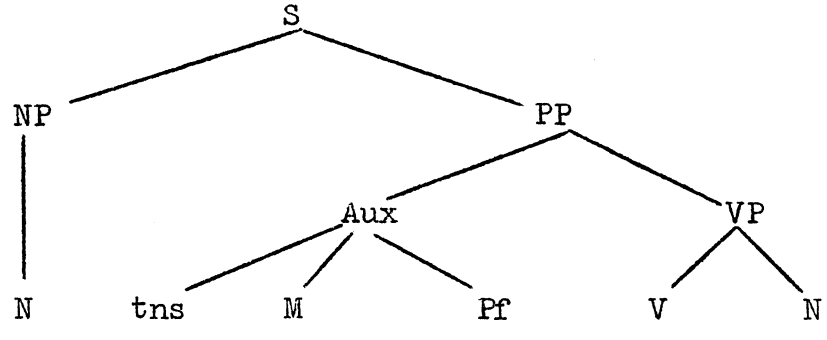
John pst grow

_____

1. Given the following trees and their permutation rules construct the derived trees.



Time Move: SD: NP + Aux + VP , Time SC: 2 1
1 2



Affix Rule: X , Aff , VB , Y SC: 1 3 2 4
1 2 3 4

where Aff = pst, en, ... and VB = M, have, V, ...

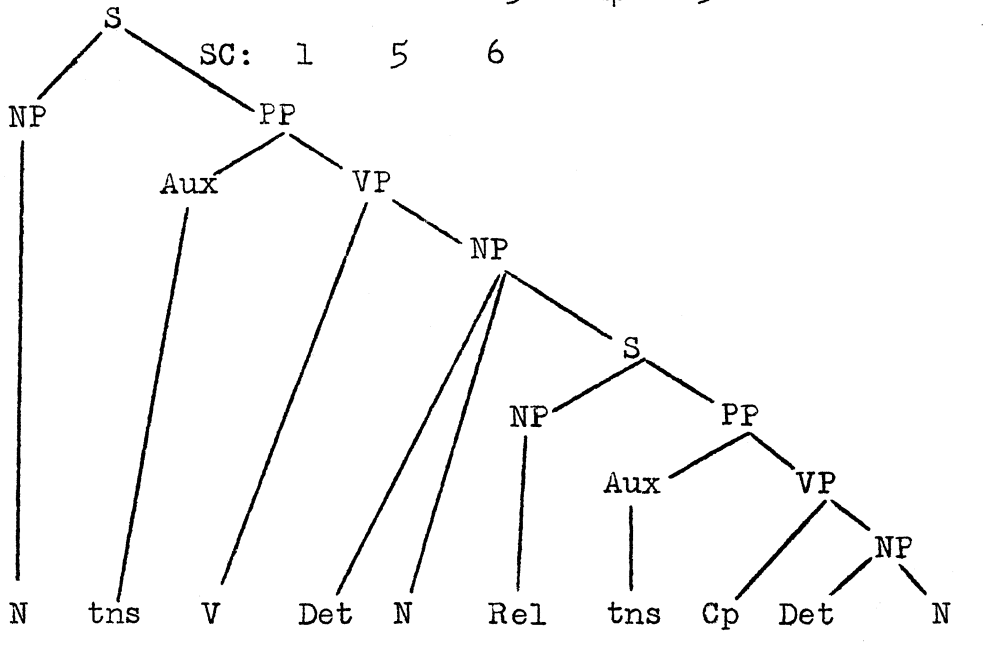
To the result of the preceding rule apply the following:

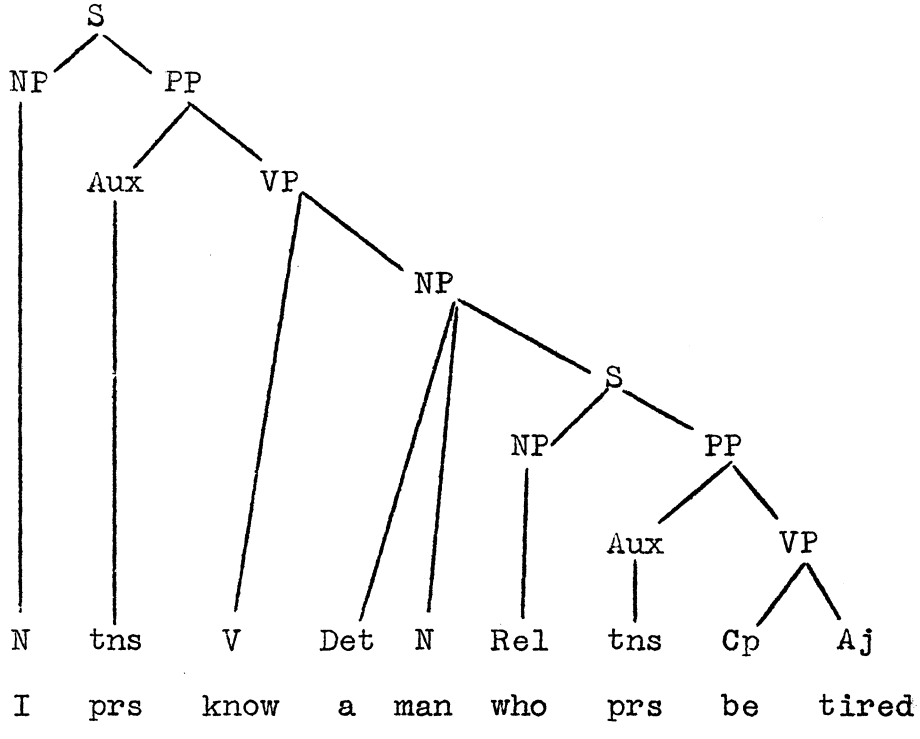
SD: NP , M + tns , X , whom SC: 4 2 1 3
1 2 3 4

1. Given the following deletion rule, say which tree the rule applies to, and construct the derived tree:

Rule: SD: X , Rel , Aux , Cp , Aj , Y
1 2 3 4 5 6

SC: 1 5 6





AREA LINGUISTICS PRACTICAL EXERCISE # 14

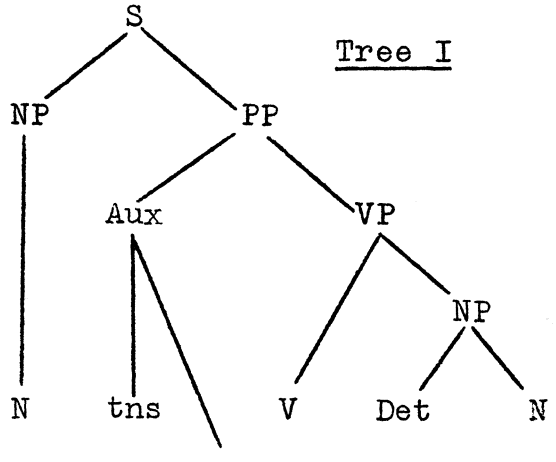
Given the following trees:

1. Write the transformations that link each tree to the one that follows it.

2. Circle each of the elementary processes involved in the rule that you write.

3. Say whether each rule is optional or obligatory on the basis of what you know about English.

4. If the rule is optional, say what sentence of English will be generated if the rule does not apply.



Tree I

Rule: SD: _____

SC: _____

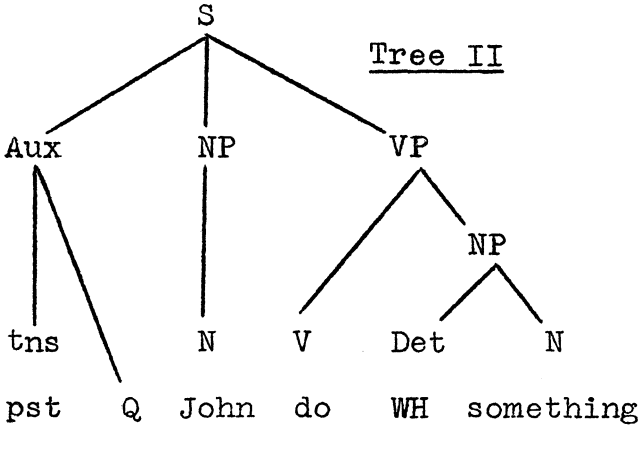
Conditions: _____

_____

Processes: Permutation
Deletion
Substitution
Adjunction

Application: Optional
Obligatory

Sentence generated if rule does not apply: _____



Tree II

Rule: SD: _____

SC: _____

Conditions: _____

_____

Processes: Permutation
Deletion
Substitution
Adjunction

Application: Optional
Obligatory

Sentence generated if rule does not apply: _____

Rule: SD: _____

SC: _____

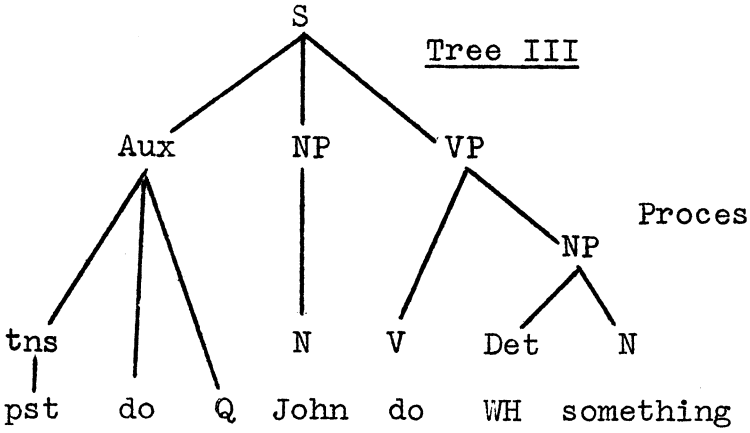
Conditions: _____

_____

Processes: Permutation
Deletion
Substitution
Adjunction

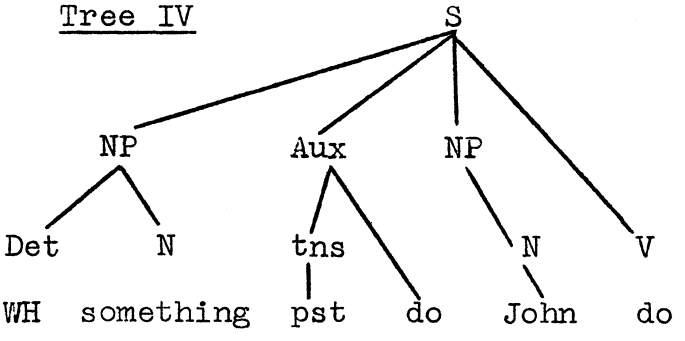
Application:
Optional
Obligatory

Tree III



Sentence generated if rule does not apply: _____

Tree IV



Sentence generated from Tree IV: _____

5. To each sentence you have supplied add the intonation.

6. In terms of what category of the tree can the normal intonation pattern of each of these sentences be approximately predicted? _____

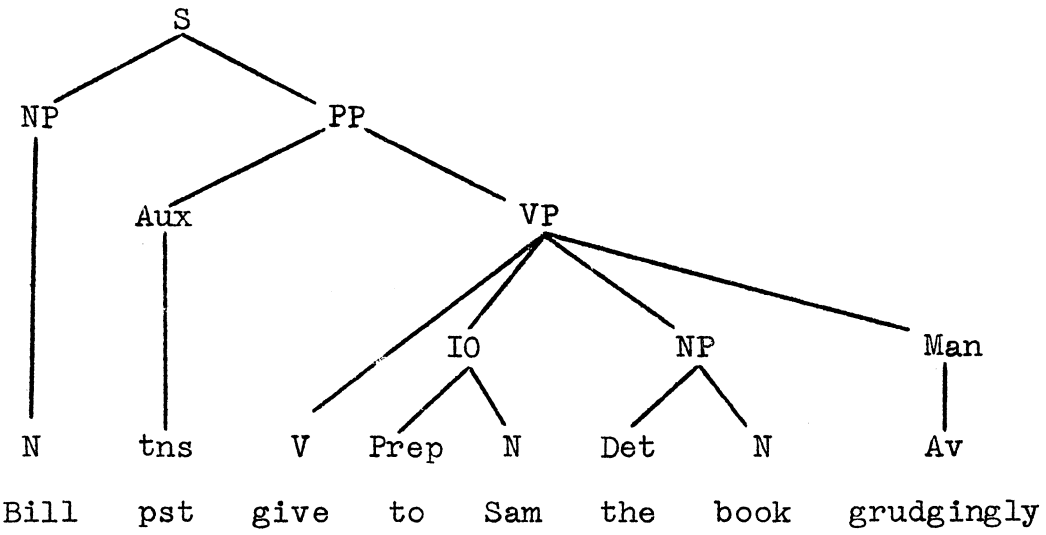
7. Summarize the rules for derived constituent structure for each of the processes involved in the rules above.

8. Write the Phrase Structure Expansion Rules required for the generation of Tree I.

9. Write the set of Phrase Structure Expansion Rules required for the direct generation of all four trees.

PRACTICAL EXERCISE # 15 AREA LINGUISTICS

A. Given the following underlying tree for English, give underlying trees for the following sentences which are uniform with it with respect to the ordering of constituents and branching in the tree.



1. Joe hesitatingly raised his hand.
2. What did Bill give to Sam?
3. Who gave the book to Sam?
4. Grudgingly, Bill gave the book to Sam.
5. John saw the book that he had given grudgingly to Sam.
6. John met the man to whom Bill had grudgingly loaned a book.
7. It was the man to whom Joe loaned a book that quietly went to sleep.

B. Write the rules to convert these underlying trees into the derived trees for the sentences given above.

C. Give the derived trees that these rules produce.

AREA LINGUISTICS PRACTICAL EXERCISE # 16

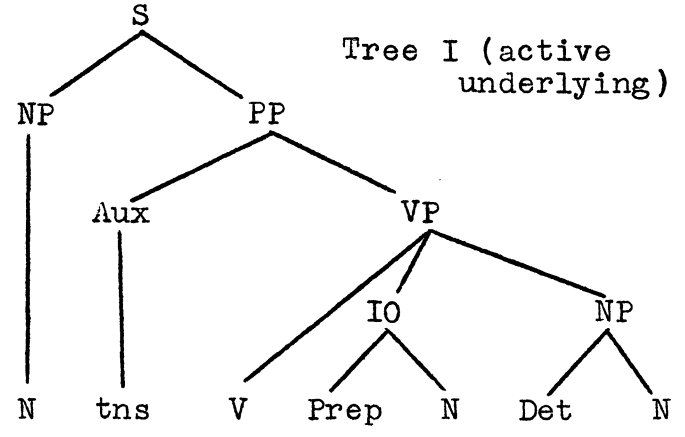
Given the following trees:

1. Trees I and IV are underlying, the others are derived. Of each derived tree, say from which other tree it is derived.

2. For each derived tree, write the rule that is required to derive the tree from the tree which you have selected as its source.

3. State which elementary processes (permutation, deletion, substitution, adjunction) are involved in the rule that you write.

4. Say whether each rule you write is obligatory or optional on the basis of what you know about English. If the rule is optional, say what sentence of English will be generated if the rule does <u>not</u> apply.



Tree I (active underlying)

John pst give to Bill the book.

Tree II

Rule:

SD: _____

SC: _____

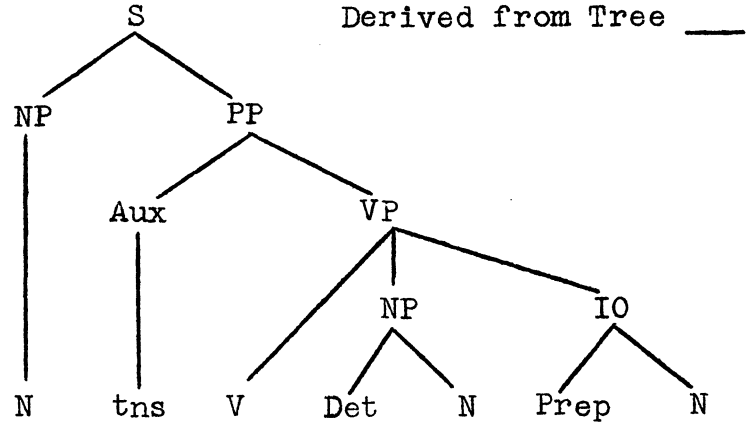
Conditions: _____

_____

_____

Processes: _____

Application: _____



Derived from Tree ___

John pst give the book to Bill

Rule:

SD: _____

SC: _____

Conditions: _____

_____

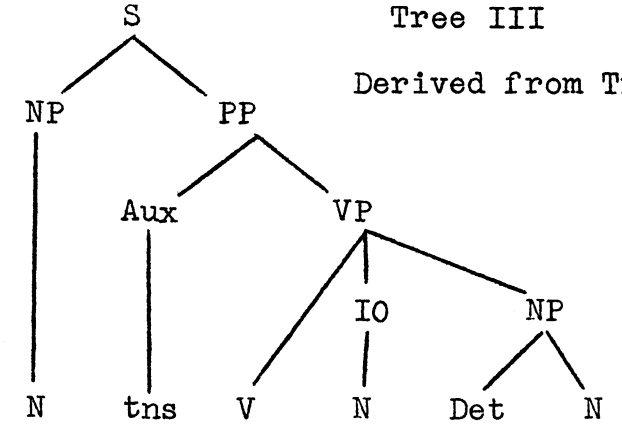
_____

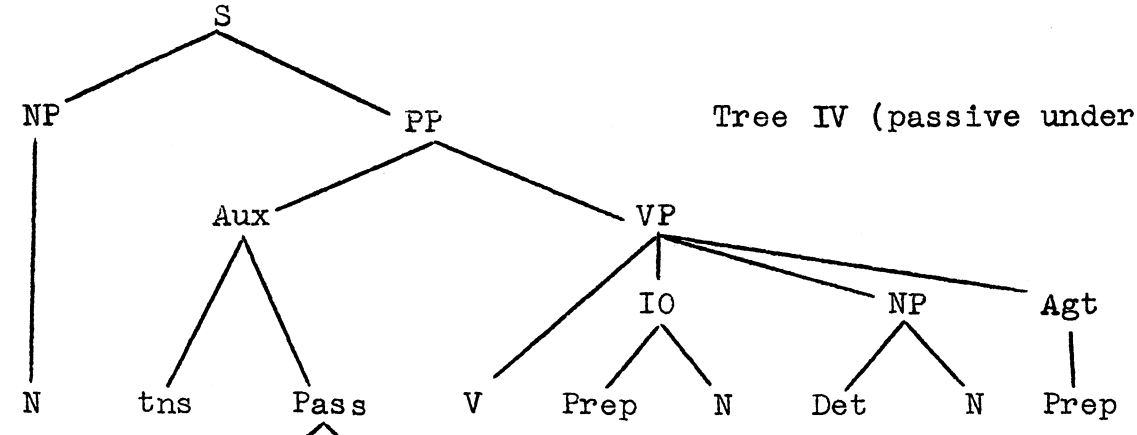
Processes: _____

Application: _____

Tree III

Derived from Tree ___





Tree IV (passive underlying)

Rule:

SD: _____

SC: _____

Conditions: _____

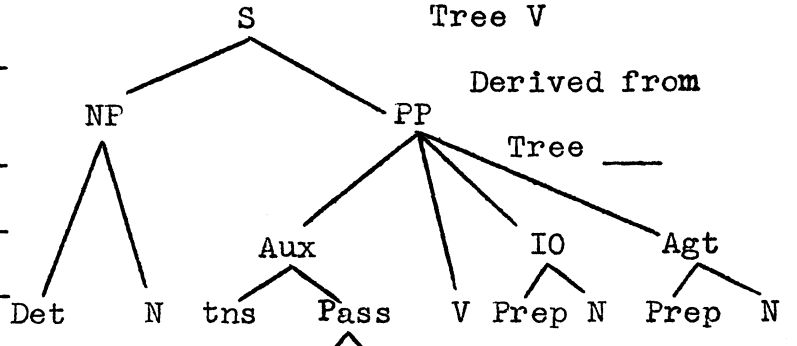
_____

Processes: _____

Application: _____

Tree V

Derived from Tree ___



Rule:

SD: _____

SC: _____

Condition: _____

_____

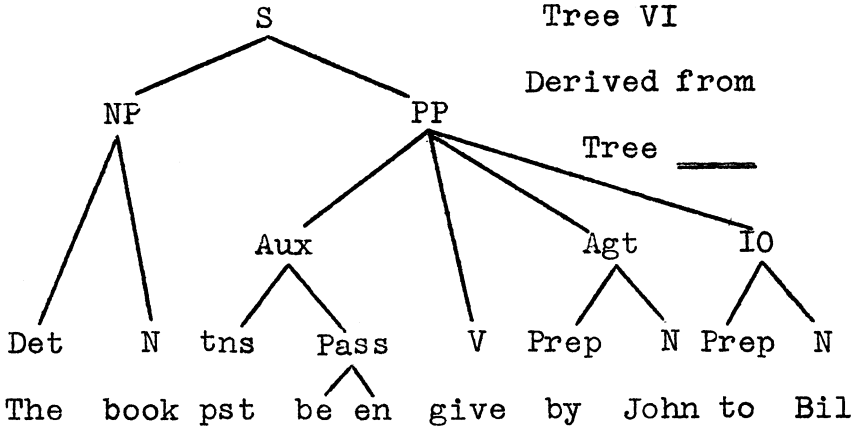
Processes: _____

Application: _____

Tree VI

Derived from

Tree ____



Rule:

SD: _____

SC: _____

Condition: _____

_____

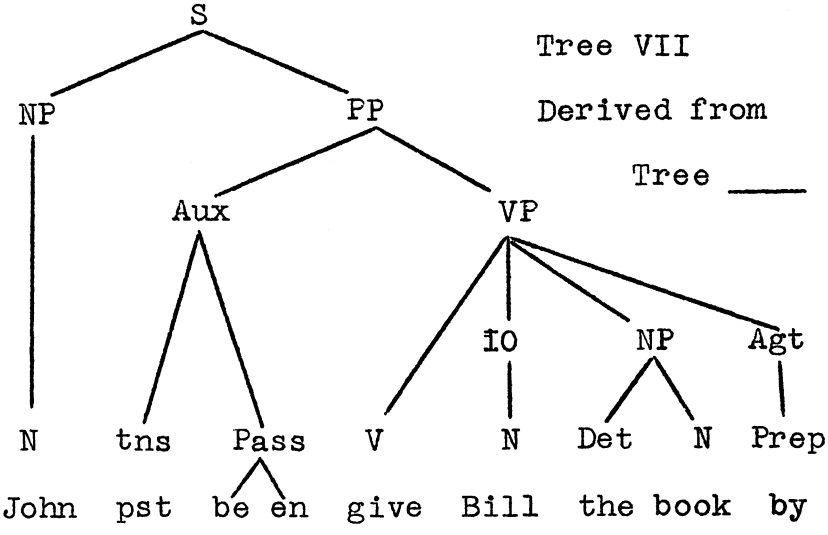
Processes: _____

Application: _____

Tree VII

Derived from

Tree ____



Rule:

SD: _____

SC: _____

Condition: _____

_____

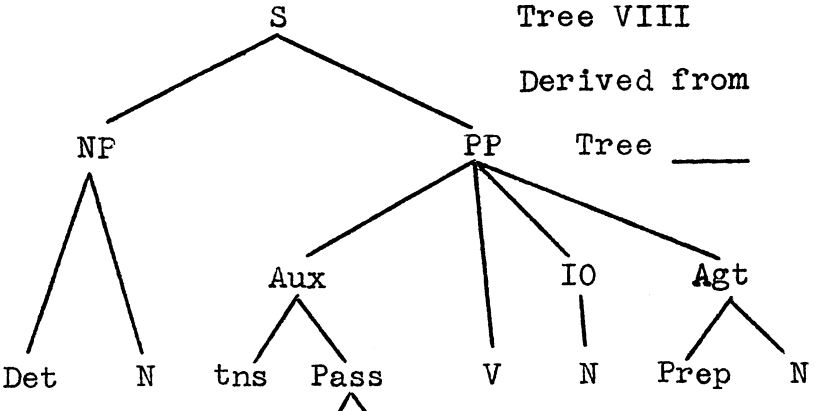
Processes: _____

Application: _____

Tree VIII

Derived from

Tree ____



Rule:

SD: _____

SC: _____

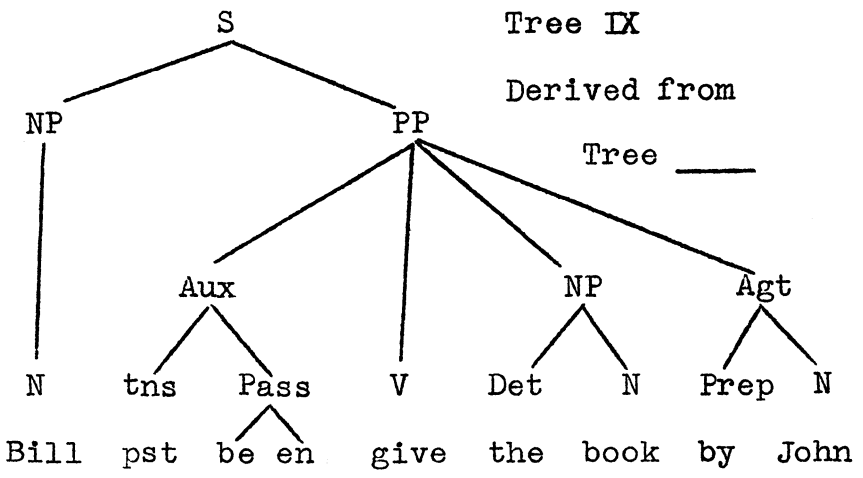
Conditions: _____

_____

Processes: _____

_____

Application: _____



Tree IX

Derived from

Tree ____

---

5. Look through the rules which you have just written to see which rules can be combined as a single rule. Be sure that in combining them you do not allow ill-formed sentences to be generated.

6. State the ways in which your rules exclude the following:

   a. *John gave the book Bill.

   b. *The book was given by John Bill.

   c. *To Bill was given by John the book.

   d. *To Bill was given the book by John.

   e. *John gave to Bill the book.

   f. *Bill was given by John the book.

7. Write Phrase Structure Expansion Rules which generate directly each of the well-formed sentences generated by your rules from the trees given above. Compare the complexity of this solution with that given by the rules to generate the underlying trees and your transformations.

8. Show by giving alternative derivations whether or not this solution can be improved upon by picking a different set of underlying trees, or by applying transformational rules in a different order, or both.

AREA LINGUISTICS PRACTICAL EXERCISE # 17

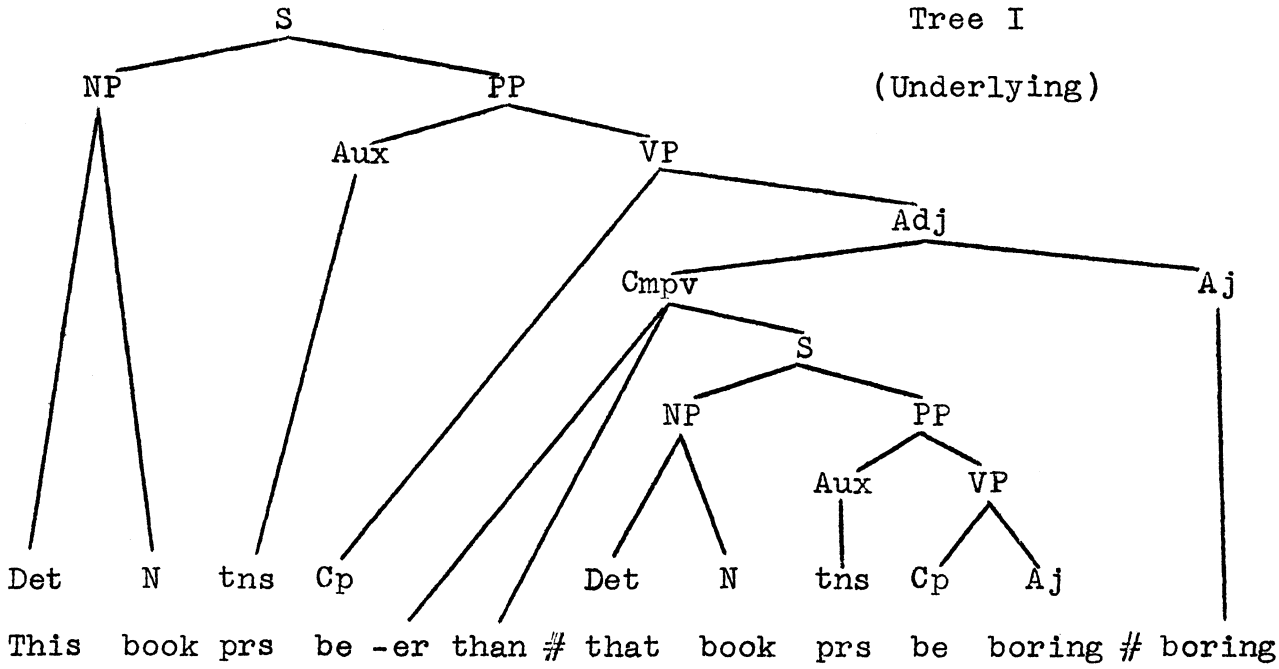
Given the following trees:

1. Each tree is derived from the tree which precedes it. For each derived tree, give the transformation by means of which it was derived from the preceding tree.

2. State which elementary processes (permutation, deletion, substitution, adjunction) are involved in the rule that you write.

Tree I

(Underlying)



Rule: _____

SD: _____

SC: _____

Conditions: _____

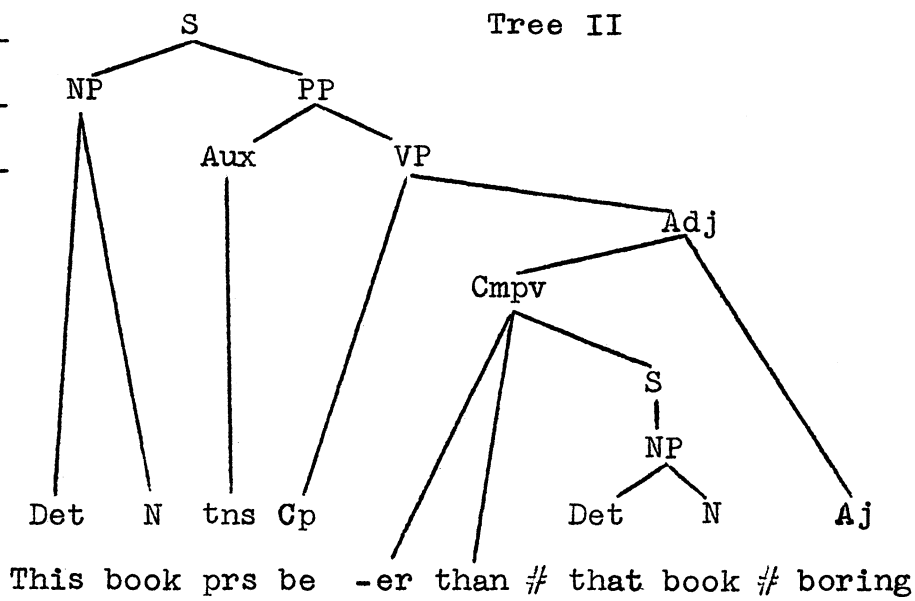
_____

_____

Processes: _____

_____

Tree II



Rule: _____

SD: _____

SC: _____

Conditions: _____

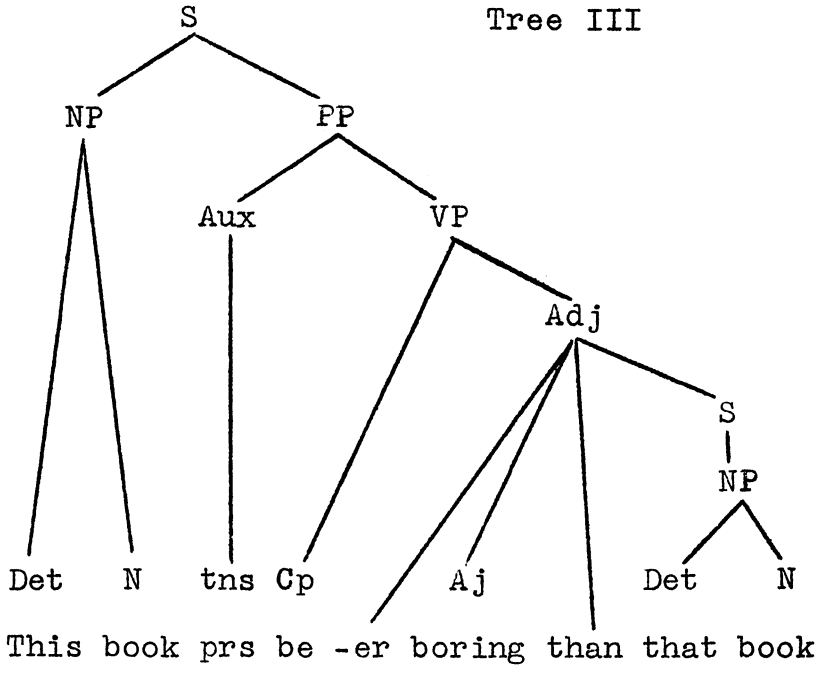
_____

_____

Processes: _____

_____

Tree III



3. Check the adequacy of the rules you have formulated by constructing parallel derivations from underlying trees which are uniform with Tree I for each of the following sentences:

   a. Bill likes milk better than coffee.

   b. Bill likes Thelma better than Velma. (ambiguous)

   c. Bill gave more ink to Sam than to Pete.

   d. Bill worked more problems for Thelma than for Velma.

   e. Tom wehn out more often with Sally than with Daisy.

   f. Tom looked out the window more often than at the blackboard.

   g. John is taller than he was.

   h. John is bored more frequently this year than he was last.

   i. John is less energetic in Chicago than in Hawaii.

   j. John is bored more often than not.

   k. Joe sleeps in class more often than you think.

   l. John is easier to obey than to please.

   m. I consider him more of a quack than a doctor.

   n. Many more people came than she had invited.

AREA LINGUISTICS PRACTICAL EXERCISE # 18

Given the following information, supply the tree with a terminal string:

1. Phrase Structure Expansion Rules:

   S --> NP + PP

   PP --> Aux + VP

   Aux--> M

   VP --> V (NP)

   NP --> (Det) N

Strict Subcategorization Rules subcategorize the elements of preterminal strings in terms of the distribution of these elements within the "frames" that are defined by the deep structure generated by the Phrase Structure Expansion Rules.

2. Strict Subcategorization Rules:

   V --> C.S.

   N --> C.S.

3. Lexicon:

   Bob, [+N, +[---]]

   book, [+N, +[Det---]]

   elapse, [+V, +[---]]

   read, [+V, +[----NP]]

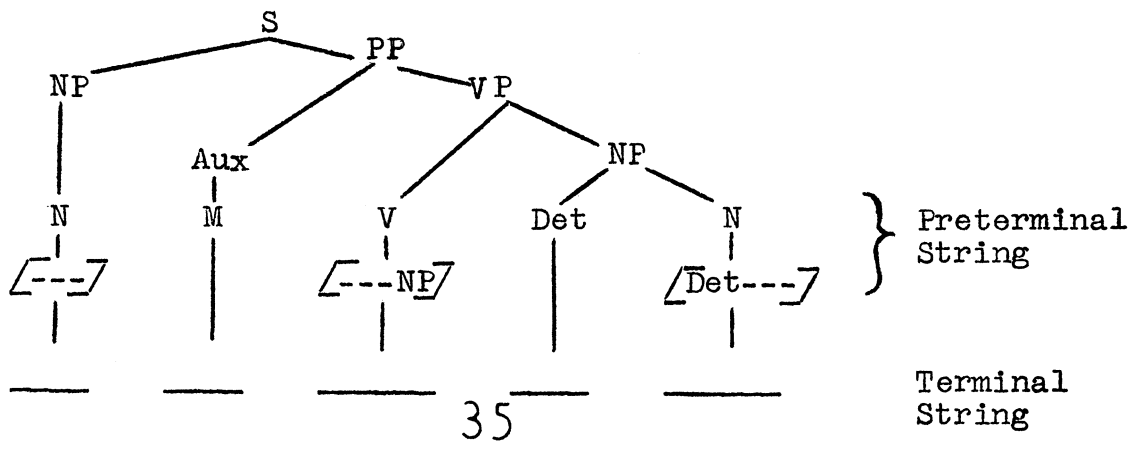
   may, [+M]

   the, [+Det]

The lexicon may be viewed as a set of lexical entries, each lexical entry of which is a pair (D,C), where D is a phonological distinctive feature matrix which spells a certain lexical formative, and C is a complex symbol. In the lexicon to the left, D is represented in the first entry by Bob, C is represented by the remainder of the entry.

4. Lexical Rule:

"If Q is a complex symbol of the preterminal string and (D,C) is a lexical entry, where C is not distinct from Q, then Q can be replaced by D." (Chomsky, 1965, 84)



AREA LINGUISTICS PRACTICAL EXERCISE # 19

Given the following Phrase Structure Expansion Rule:

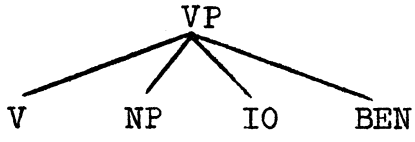
VP ---> V (NP) (IO) (BEN) (MAN) (RATE)

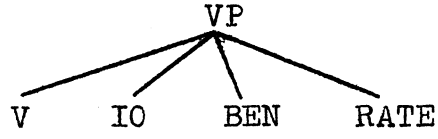
and the following lexical entries:

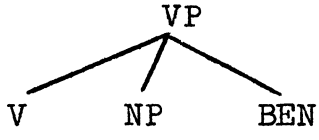
buy, [+V, +[--- NP (BEN) (MAN) (RATE)]]
[+V, +[--- (BEN) (MAN)]]

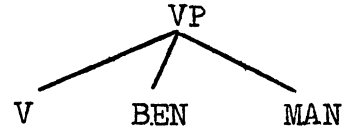
give, [+V, +[--- (NP + IO) BEN (MAN)]]
[+V, +[--- NP (IO (BEN)) (MAN) (RATE)]]

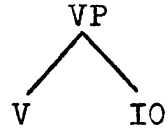
say in each of the following cases which entry (ies) the lexical rule will attach to V :

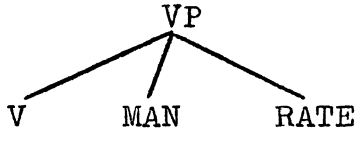
1 

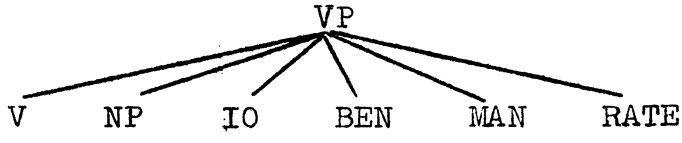
2 

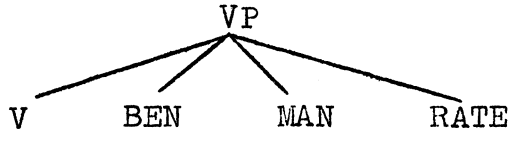
3 

4 

5 

6 

7 

8 

Derive all the remaining frames that the rule above will generate. Say in each case what verbs will attach to V.

AREA LINGUISTICS PRACTICAL EXERCISE # 20

Given the following features:

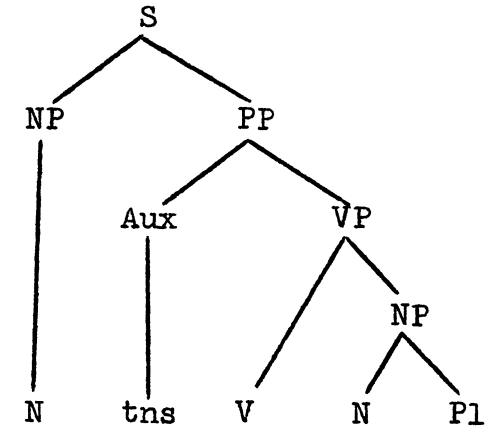
a. Major lexical category: [+N]

b. Contextual features: ÷[---]

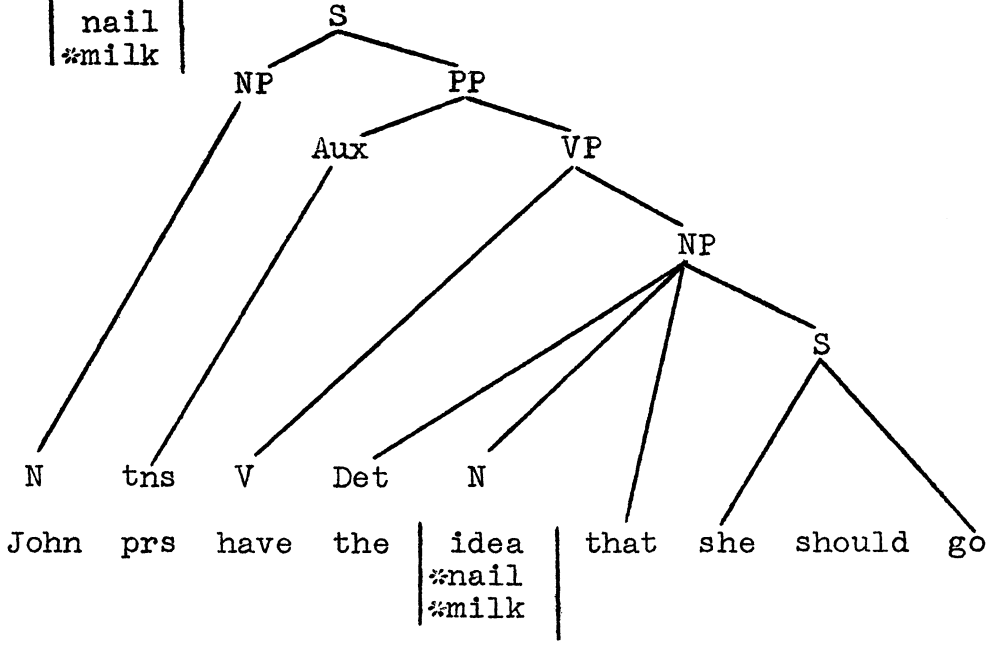
+[---- (Pl)]

÷[---- that + S]

and given the following trees:



John prs have | idea
nail
*milk | s



John prs have the | idea
*nail
*milk | that she should go

Determine the lexical entries for the nouns, idea, nail, and milk.

AREA LINGUISTICS PRACTICAL EXERCISE # 21

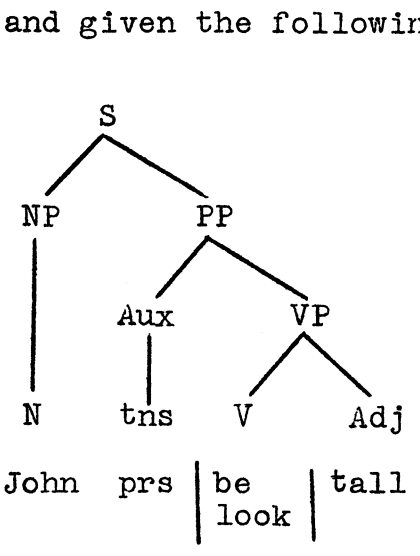
Given the following features:

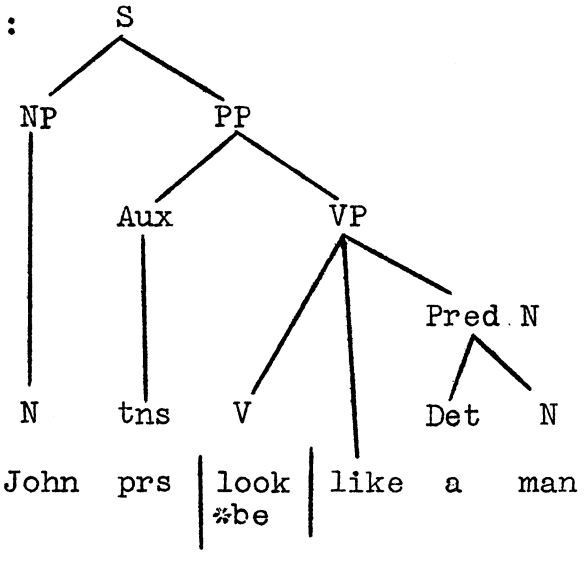
a. Major lexical Category: [+ V]

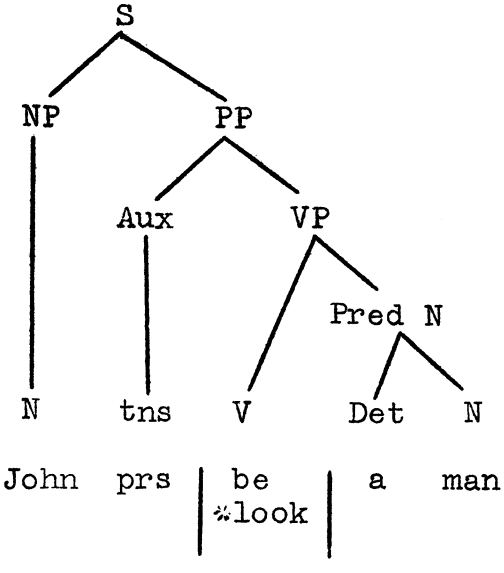
b. Contextual Features: +[---- Adj]

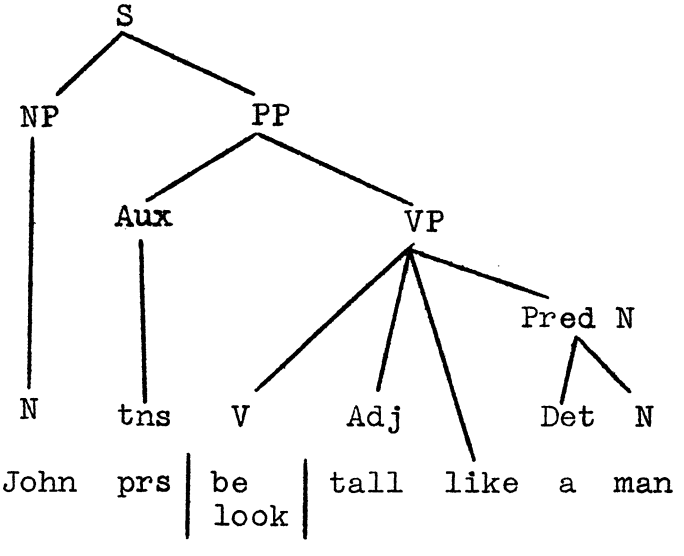
+[---- like + Pred N]

and given the following trees:









Determine lexical entries for the verbs, be and look.

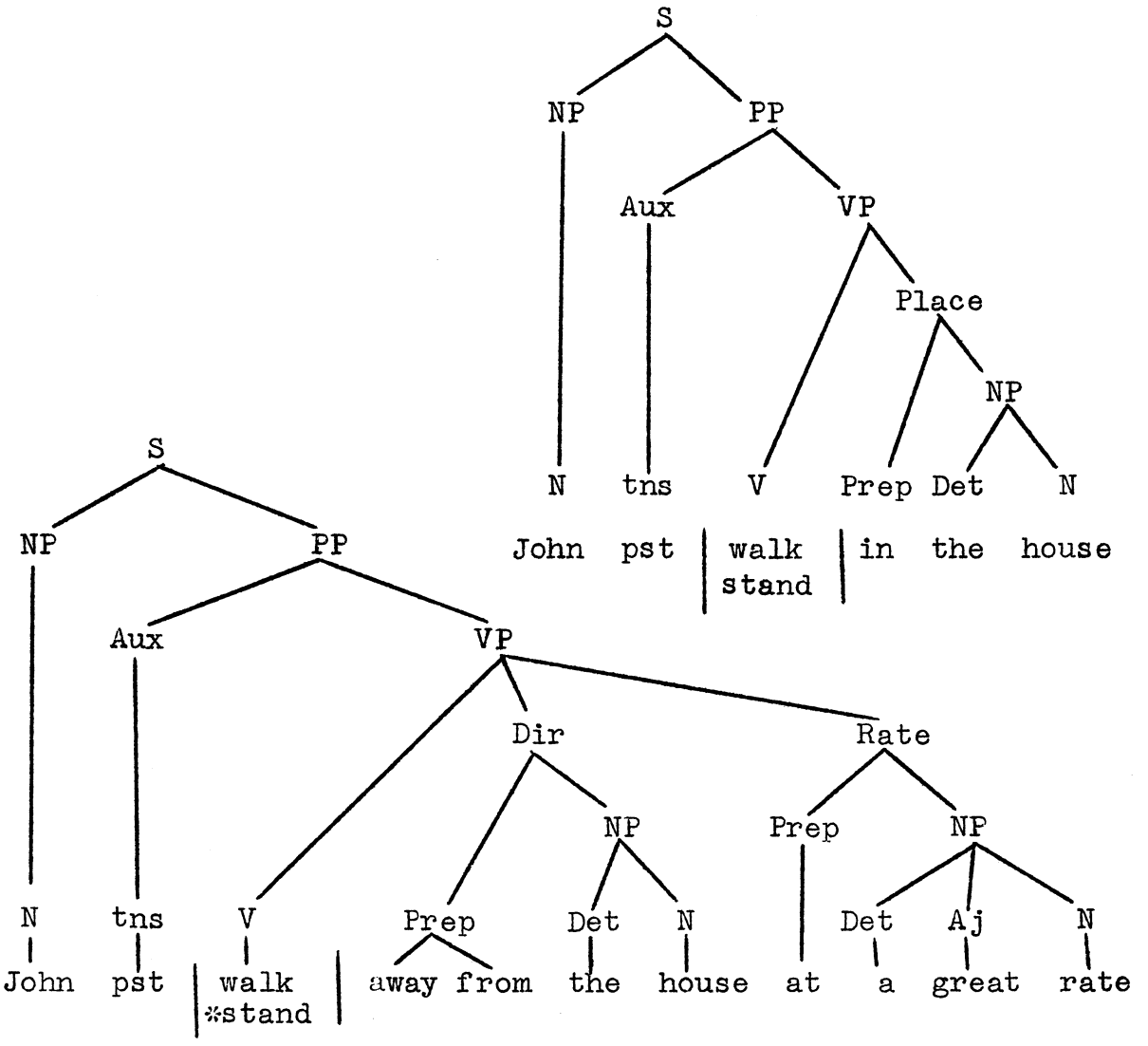
AREA LINGUISTICS PRACTICAL EXERCISE # 22

Given the following features:

a. Major lexical category: [+ V]

b. Contextual features: +[---- Dir]
+[---- Rate]
+[---- Place]

and the following trees:



Determine lexical entries for the verbs, walk and stand.

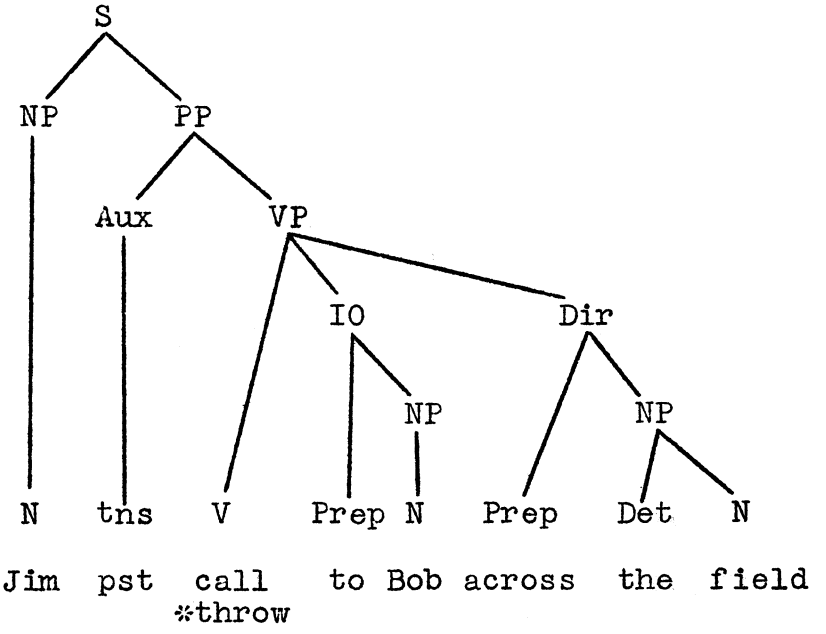
AREA LINGUISTICS PRACTICAL EXERCISE # 23

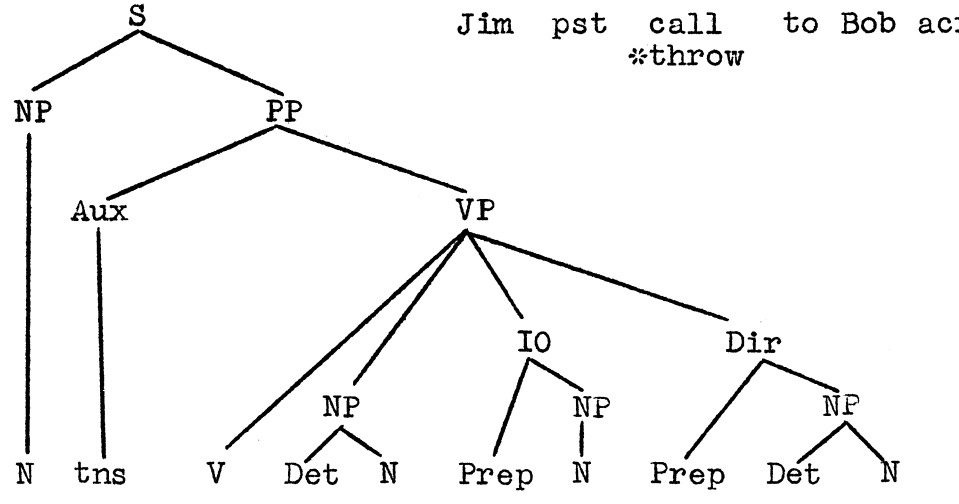
Given the following features:

a. Major lexical category: [+V]

b. Contextual features: +[---- NP]
+[---- IO]
+[---- Dir]

and the following trees:





Constructing other sentences as needed, determine lexical entries for the verbs, call and throw. _____

AREA LINGUISTICS PRACTICAL EXERCISE # 24

Given the following rules:

1. NP ---> D + N
2. N ---> [± Count]
3. [+ Count] ---> [± Singular]
4. D ---> [± Definite]
5. D ---> C.S. / ____ ε (where ε is an N)

and the following lexical entries:

the [+D, [+ Definite]]

this [+D, [+ Definite][+ Count][+ Singular]]

[+D, [+ Definite][- Count]]

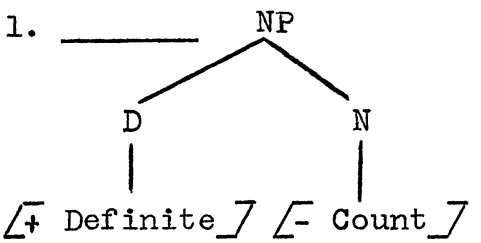
these [+D, [+ Definite][+ Count][- Singular]]

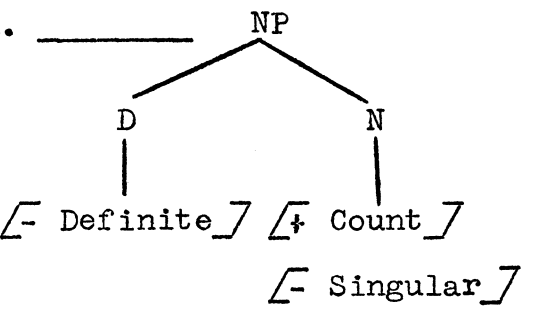
a [+D, [- Definite][+ Count][+ Singular]]

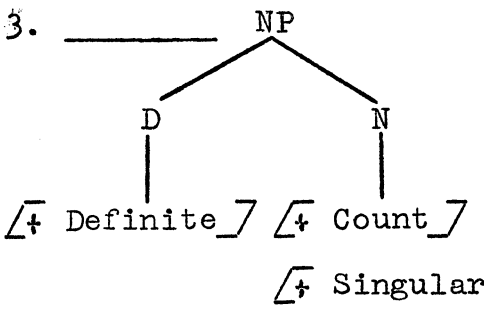
some [+D, [- Definite][+ Count][- Singular]]

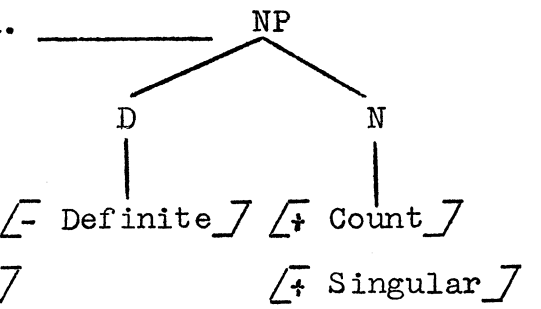
[+D, [- Definite][- Count]]

pick the lexical entries that substitute for D in the following cases:

1. 

2. 

3. 

4. 

Given the following rules:

1. VP --> V (NP)
2. NP --> Det + N
3. N --> [± Animate]
4. V --> C.S. / ___ Det + ε (where ε is an N)

and the following lexical entries:

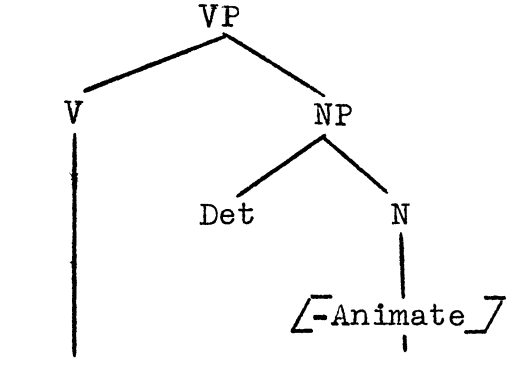
dog [+N, +[Det ___ (Pl)], [+Animate]]

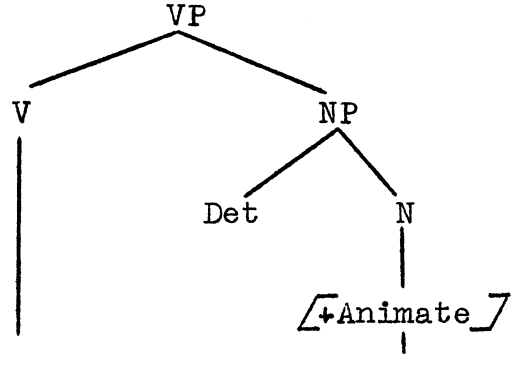
knife [+N, +[Det ___ (Pl)], [-Animate]]

scare [+V, +[___ NP], +[___ Det [+Animate]]]

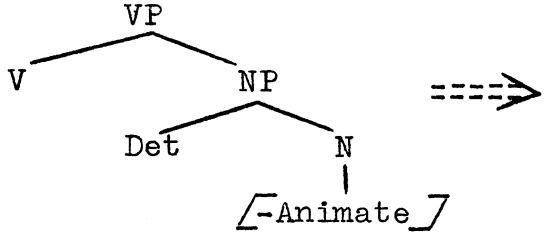
bend [+V, +[___ NP], +[___ Det [-Animate]]]

supply the appropriate lexical items for the following trees:





Show exactly what rule (4) above does to the following tree:



The entry for <u>scare</u> has three parts--explain the function of each:

[+V] _____

+[---- NP] _____

+[---- Det [+Animate]] _____

Say exactly what prevents the grammar from yielding *...bend the dog..., *...scare knife..., *...dog the scares...

AREA LINGUISTICS PRACTICAL EXERCISE # 26

Consider the following two sets of sentences:

{The knife / The dog} {frightened / scratched / lured / tempted / fascinated / pleased / tantilized} the boy.

{*The knife / The dog} {attacked / believed / trusted / saw / heard / smelled / looked for} the boy.

In the light of these sentences and the following rules:

S --> NP + PP

PP --> Aux + VP

VP --> V (NP)

NP --> Det + N

N --> /± Animate/

V --> C.S. / @ Aux ___ (where @ is an N)

make up partial lexical entries for the following:

knife _____

_____

dog _____

_____

lure _____

_____

trust _____

_____

AREA LINGUISTICS PRACTICAL EXERCISE # 27

Consider the following two sets of sentences:

The dog / The dogs	fought, howled, died, ate, smiled, barked	*The dog / The dogs	scattered, congregated, dispersed, met, feuded, kissed, united, worked together, ganged up, joined forces, gathered, disbanded, disputed, assembled

In the light of these sentences and the following rules:

S ---> NP + PP

PP ---> Aux + VP

VP ---> V

NP ---> Det + N

N ---> /± Singular/

V ---> C.S. / @ Aux ___ (where @ is an N)

supply the following words with partial lexical entries:

dog _____

_____

dogs _____

_____

howl _____

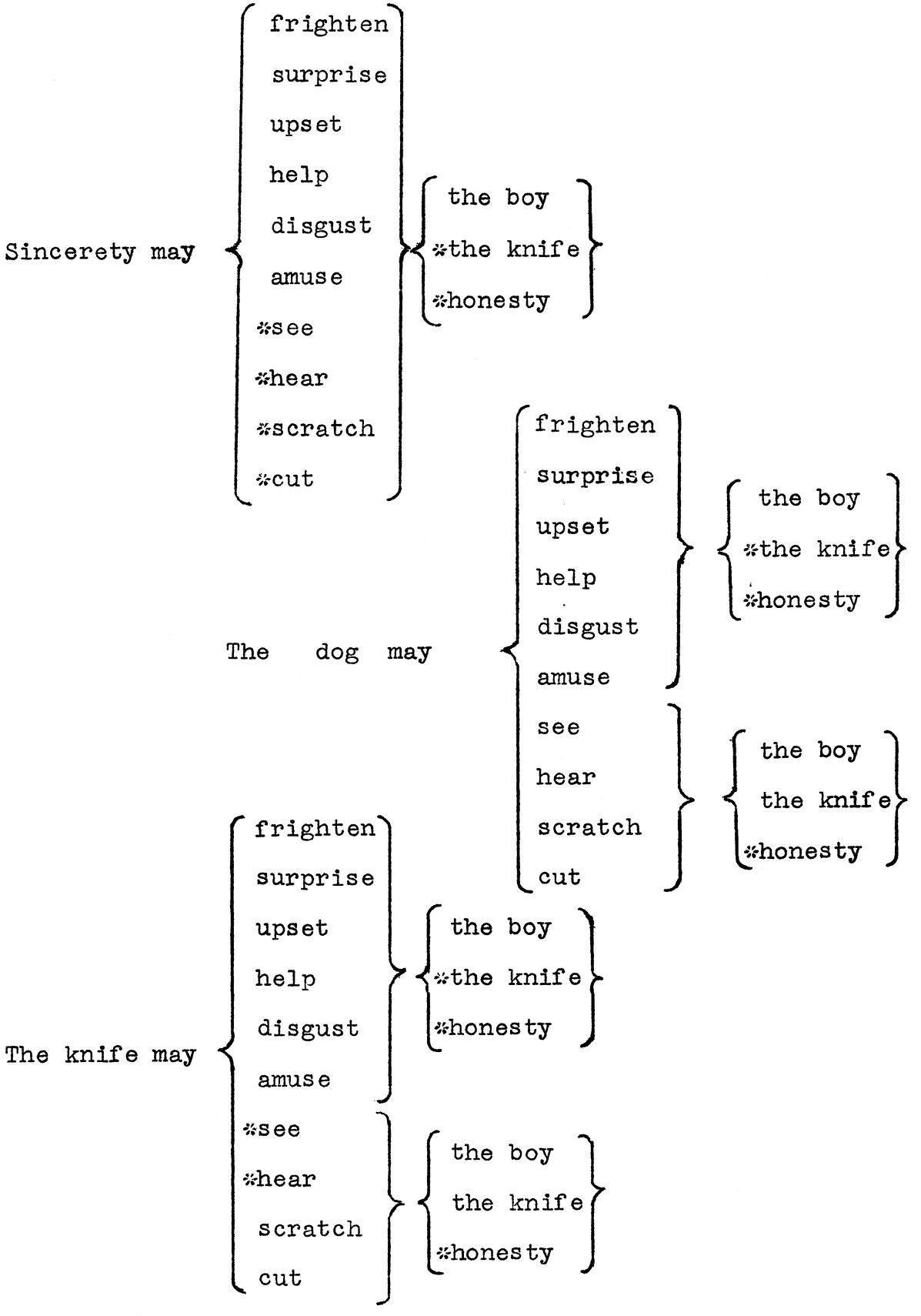
_____

unite _____

_____

AREA LINGUISTICS PRACTICAL EXERCISE # 28

Consider the following sentences:



Assuming that the relevant features involved are [Animate] and [Abstract], complete the following set of rules:

S ---> NP + PP

PP ---> Aux + VP

VP ---> V (NP)

Aux --> M

V ---> C.S.

NP ---> D + N

N ---> [_____]

[_____] ---> [_____]

_____

V ---> _____

_____

Complete the following lexical entries where required:

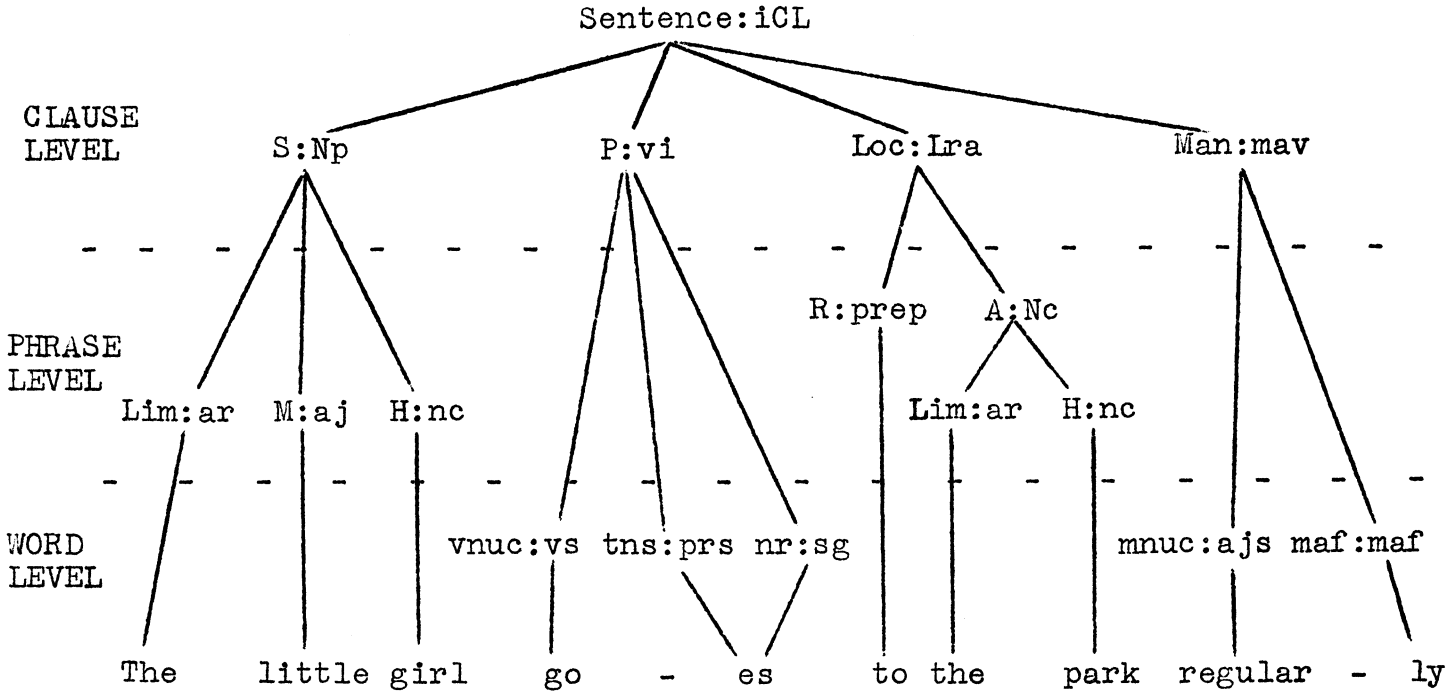
may	[+M]
sincerety	[+N, [Animate][Abstract]]
ø	[+D, +[___ [+ Abstract]]]
the	[+D, +[___ [Abstract]]]
dog	[+N, [+ Animate]]
knife	[+N, [_____][_____]]
frighten	[+V, +[___ NP], +[___ D [+ Animate]]]
scratch	[_____
hear	[_____
see	[_____
cut	[_____
surprise	[_____
upset	[_____

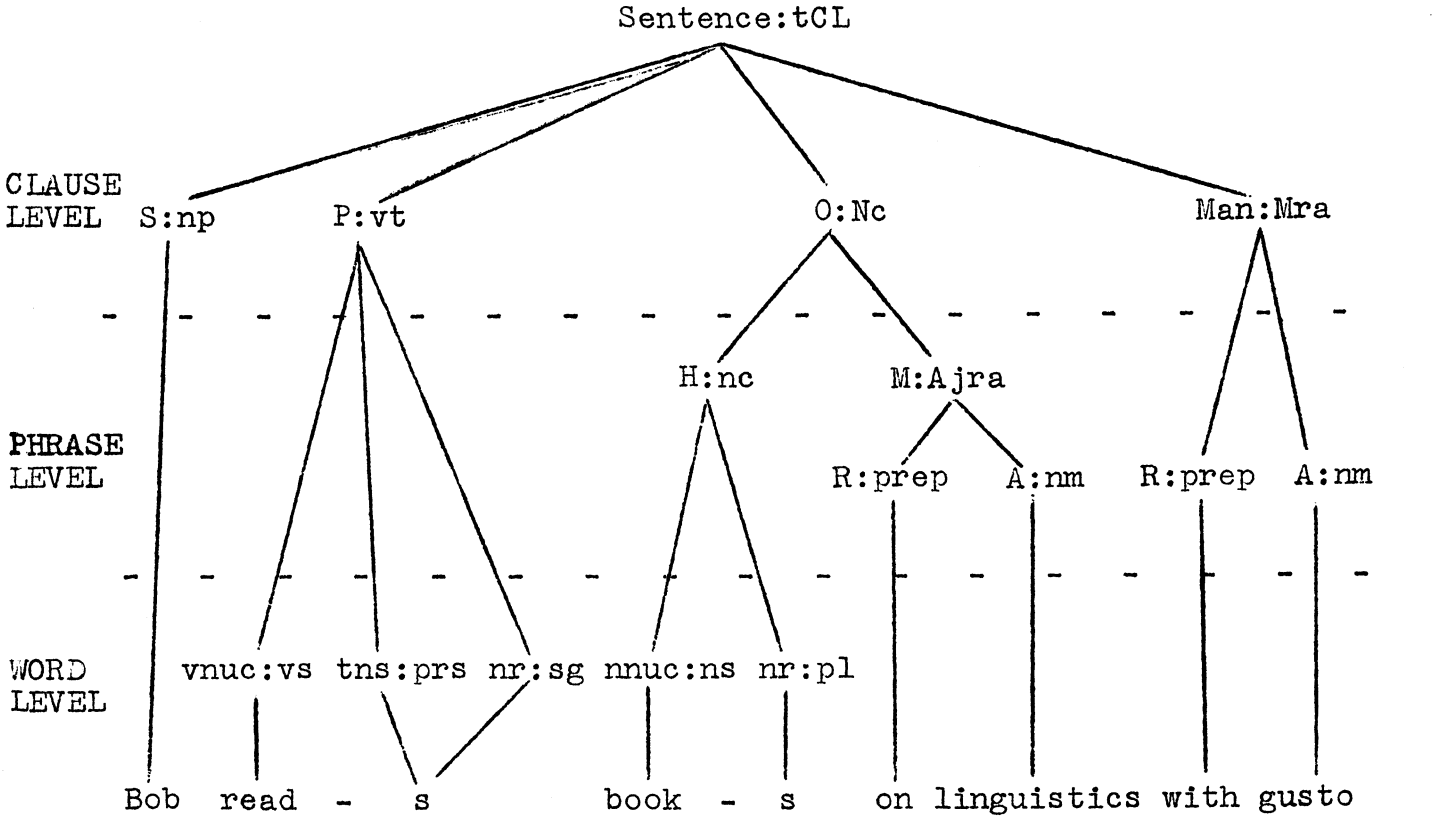
Derive five sentences with your rules.

ILLUSTRATIVE MATERIAL

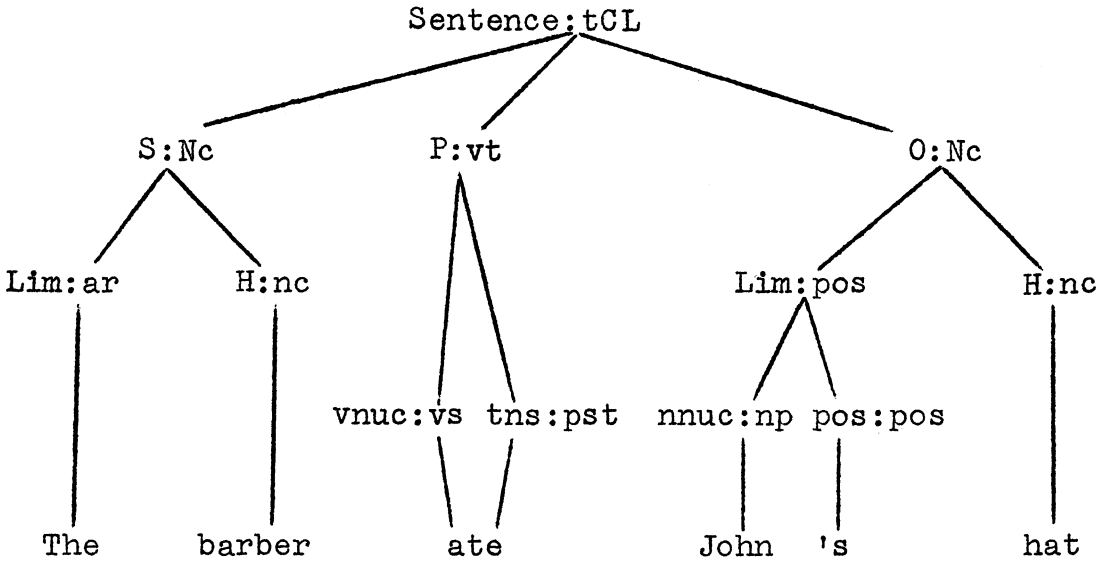
Students who are freed from the onus of note-taking by prepared illustrative materials distributed in class sometimes think and sometimes ask questions leading to fruitful exchanges with other students or the instructor. It is the impression of this writer that the use of illustrative materials encourage and facilitate this kind of interaction. It was the desire to stimulate this kind of fruitful discussion that prompted the production of these fragmentary illustrations and summaries.

Tagmemic Formulae Interpreted as Labeled Brackets





Tagmemic Formulae Interpreted as Phrase Structure Expansion Rules



Phrase Structure Expansion Rules to generate the tree above:

1. Sentence:tCL ---> S:Nc + P:vt + O:Nc
2. S:Nc ---> Lim:ar + H:nc
3. P:vt ---> vnuc:vs + tns:pst
4. O:Nc ---> Lim:pos + H:nc
5. Lim:pos ---> nnuc:np + pos:pos

These rules are to be interpreted as follows: (taking rule (1) as an example.)

Re-write the symbol 'Sentence:tCL' as the string of symbols 'S:Nc + P:vt + O:Nc'. (Rules two through five are to be read analogously.)

The tree that these rules generate is to be interpreted in the following manner:

The category or symbol to the left of an arrow corresponds to a symbol in the tree which is said to <u>dominate</u> the string corresponding to the string to the right of that arrow. E.g.: S:Nc <u>dominates</u> the string: Lim:ar + H:nc.

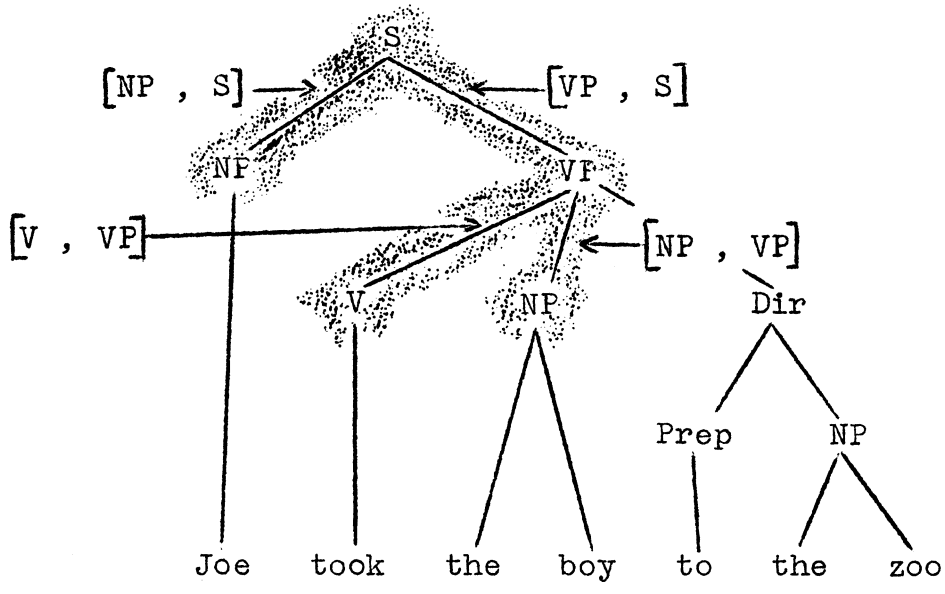
Syntactic Relations as Expressed by Underlying Trees

Phrase Structure Expansion Rules (A) mark the underlying constituent structure of sentences in terms of trees (B). The syntactic relations among constituents of a sentence are implicit in the topological configuration of the tree and are made explicit by a set of definitions (C).

A. Phrase Structure Expansion Rules:

1. S ----> NP + VP
2. VP ----> V + NP + Dir(ection)
3. Dir ----> Prep + NP

B. A Tree:

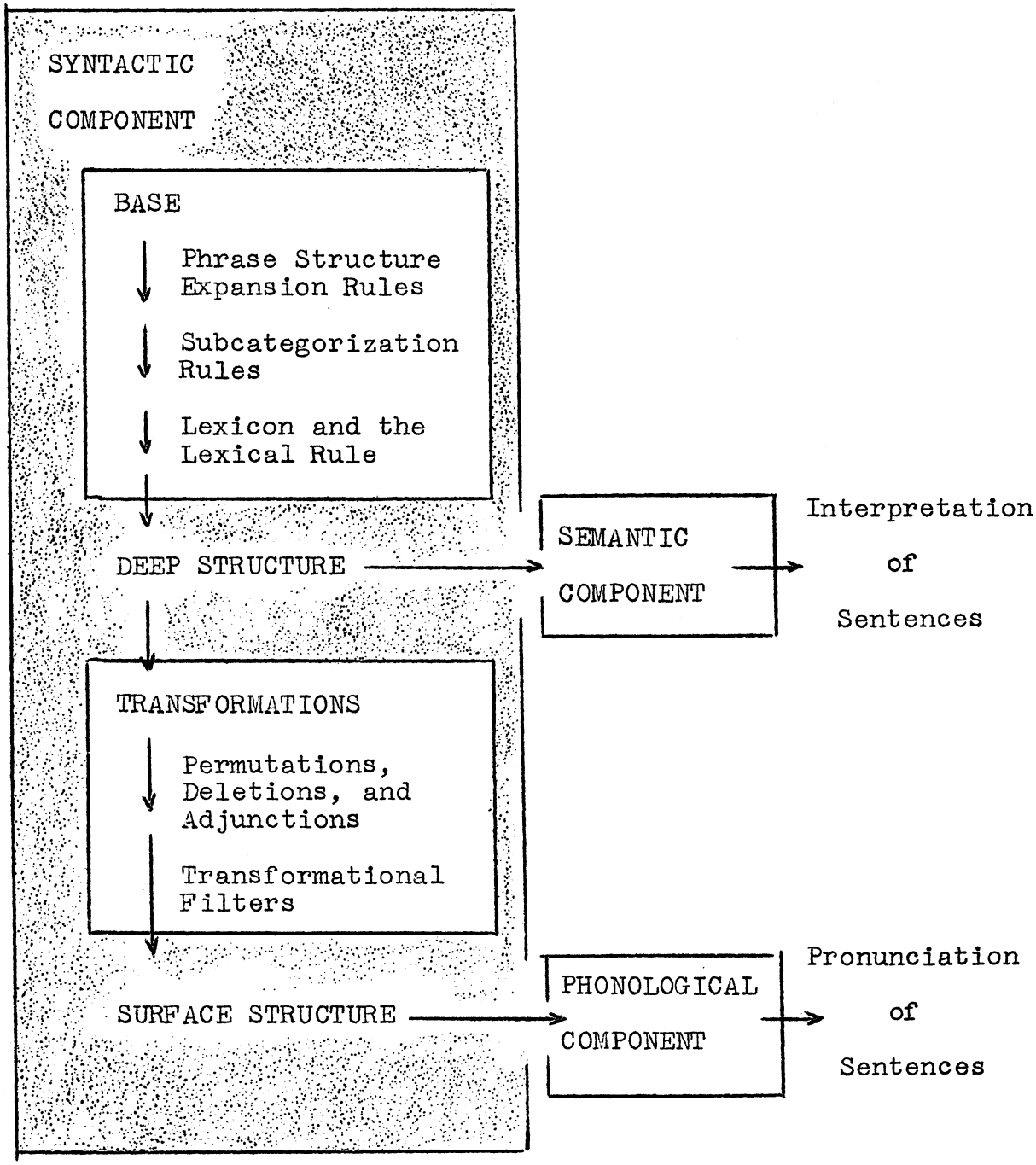


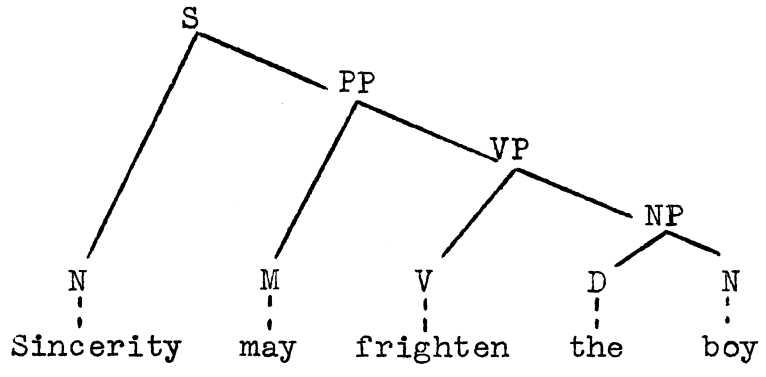
C. Some Definitions Explicating Syntactic Relations:

1. [NP , S] = Subject of the sentence
2. [VP , S] = Predicate of the sentence
3. [NP , VP] = Direct object of the verb phrase
4. [V , VP] = Main verb of the verb phrase

The Components of a Grammar

The study of "grammar" is the study of the capability of fluent speakers of a language to effect a recursive pairing of the semantic interpretations of sentences with their corresponding phonological representations and vice-versa.



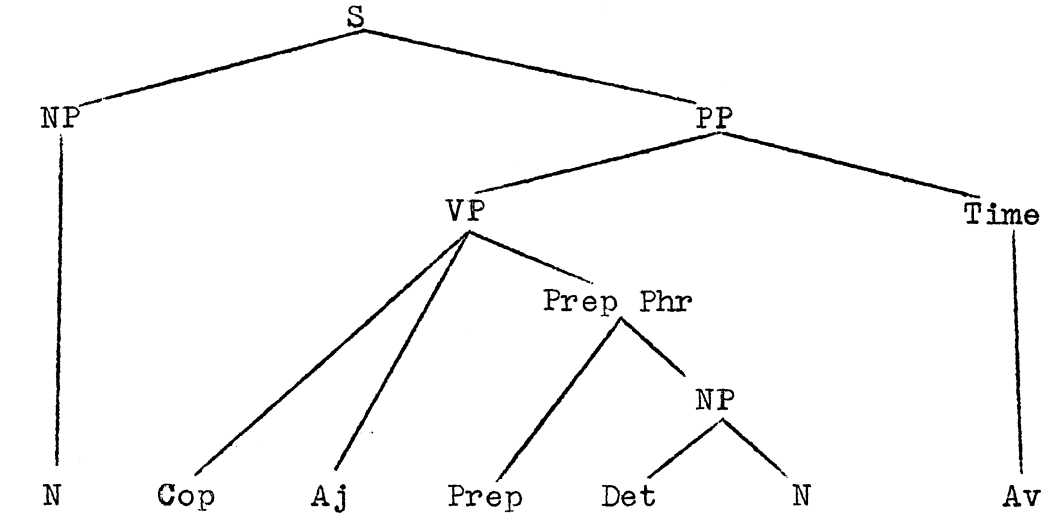


Why this branching structure rather than some other?

1. Motivation from the relevance of constituents for the subcategorization of major categories: We should like to include as constituents of VP all and only those categories of the predicate which subcategorize the category of Verbs. Thus, in English, while all verbs take Time adverbs, Place adverbs, and Modal auxiliaries, only a subcategory of the category of Verbs in English take noun objects (i.e., transitive verbs). Thus we will mark Time, Place, and Modal as constituents of PP, but not of VP, while we include as constituents of VP such categories as Manner adverb , Direction adverb , Rate adverb , and Indirect Object since these all subcategorize the category of English Verbs.
2. Motivation from the convention for marking syntactic relations. According to the current convention, syntactic relations are marked by the patterns of domination in the tree. The subject relation in the underlying tree is that which obtains between S and the NP immediately dominated by S. If the object of the verb were immediately dominated by S, it would be indistinguishable from the subject of the sentence on our present convention.

Some Examples of Permutation Transformations

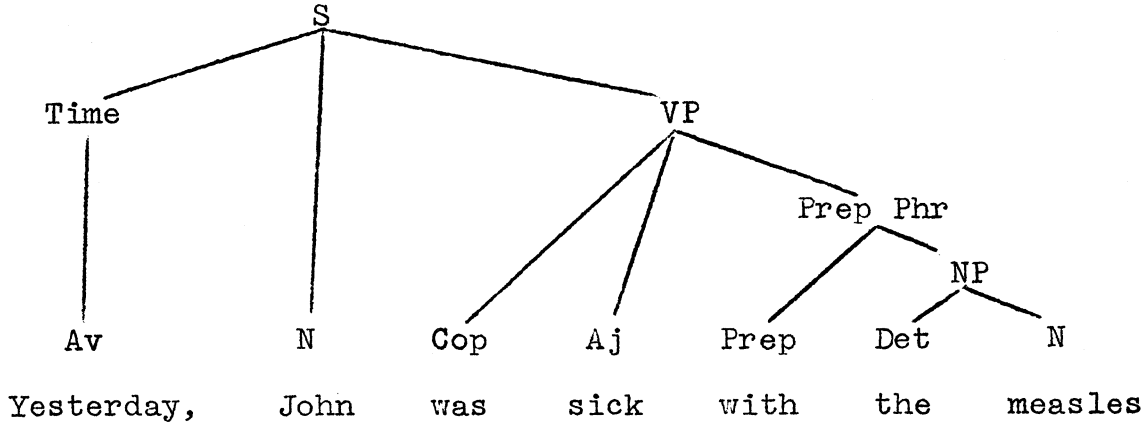
Transformations serve to map the deep structures required as input by the semantic component onto the surface structures required as input by the phonological component. A high degree of layering and a low degree of ramiformity from any given node is characteristic of the deep structures. A low degree of layering and a high degree of ramiformity is characteristic of the surface structures.



Permutation Rule:

Structural Description: NP + VP + Time
1 2

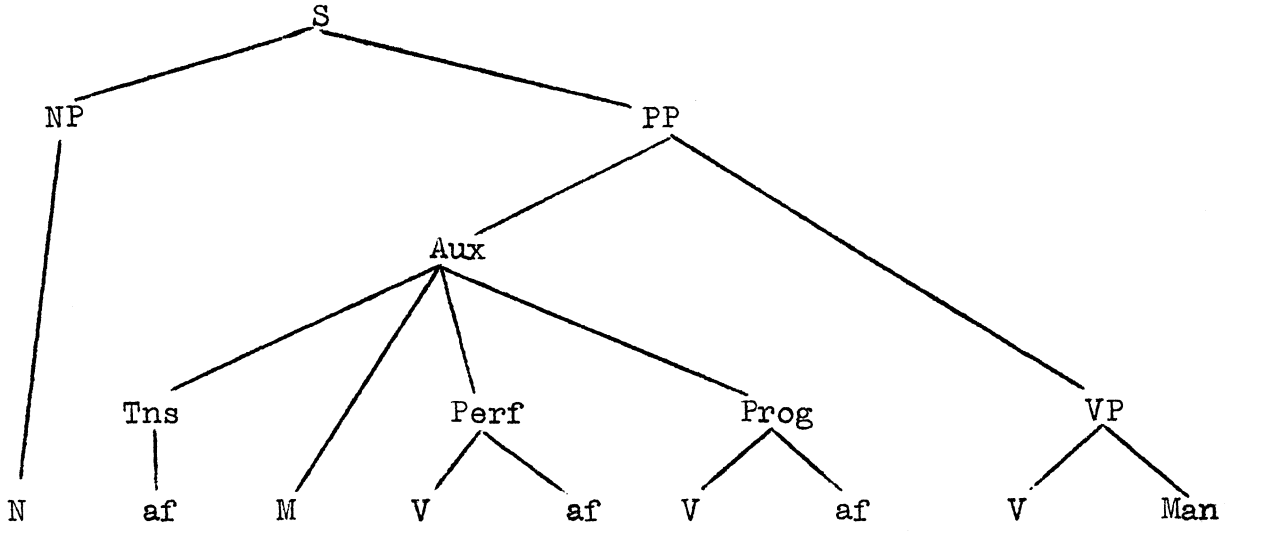
Structural Change: 2 1



Note that the node PP is lost. Branches must mark unique constituent structure and thus are not allowed to cross. The node PP was lost because one of its branches (Time) was moved to the left of the adjacent constituent of S, (NP).

Some Examples of Permutation Transformations

Permutations sometimes effect a striking reduction in layering of underlying trees. A reasonably good example is that resulting from the verbal affix permutation.

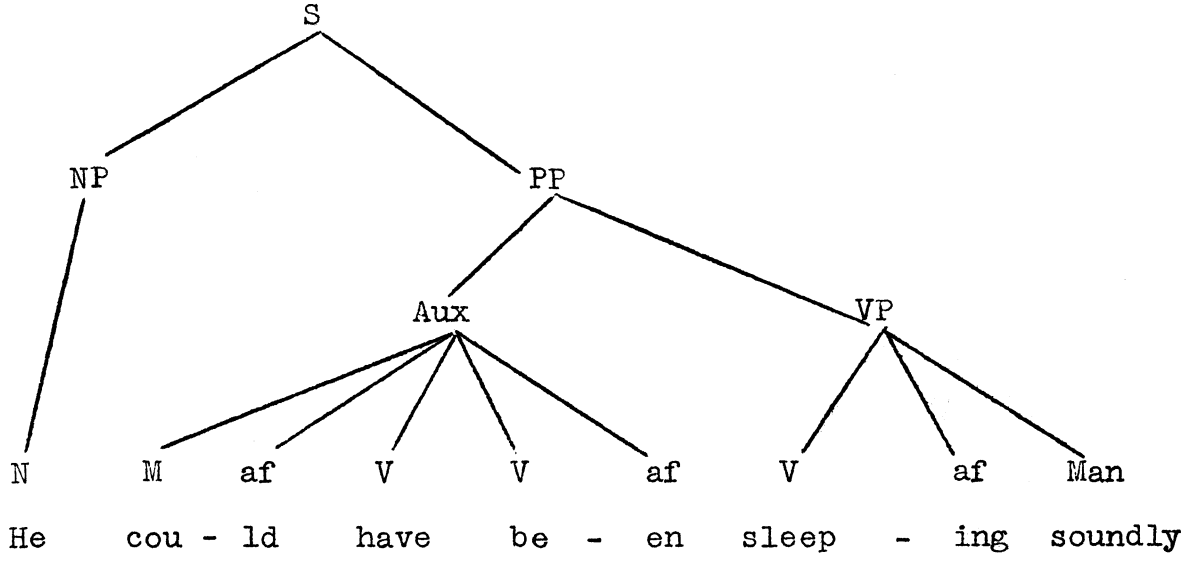


Permutation Rule:

Structural Description: $af + \begin{Bmatrix} M \\ V \end{Bmatrix}$

1 2

Structural Change: 2 1



Phrase Structure Expansion Rules.

1. Apply obligatorily wherever they apply, although a given rule may contain several options for the re-writing of a given category:

   a. Braces: enclose alternative (and mutually exclusive expansions of a category.

   b. Parentheses: ( ) enclose optional constituents of a given category.

2. Apply only to the last line of a derivation, i.e., only to unexpanded nodes.

3. Apply only to one formative or category at a time.

4. Serve to expand a single formative as a string of formatives (or categories).

5. They produce trees that mark grammatical relations in a uniform manner and that mark constituent structure in a way that reflects the degree of relevance any two constituents have to one another for purposes of sub-categorization of a category.

Transformational Rules:

1. Link the representation of a sentence required by the semantic component to the representation of a sentence required by the phonology. That is, they map deep structure onto surface structure. They convert trees that mark relations of grammatical categories (for selection, co-occurrence, subcategorization, and grammatical functions (Subject of Sentence, Main Verb of the Verb Phrase, etc.)) onto trees that give the linear sequences which correspond in the ordering of their elements to that of the spoken sentence.

2. Transformations do not apply to single, unexpanded nodes one at a time to generate tree structure, but rather they apply to whole trees. A transformation will apply to any tree that has the structure specified by the structure index of the transformation (cf. 6 below).

3. Transformations do not perform the operation of expanding single nodes but rather perform the operations of

   a. Permutation (rearrangement of the parts of a tree),

   b. Deletion (removing parts of a tree), and

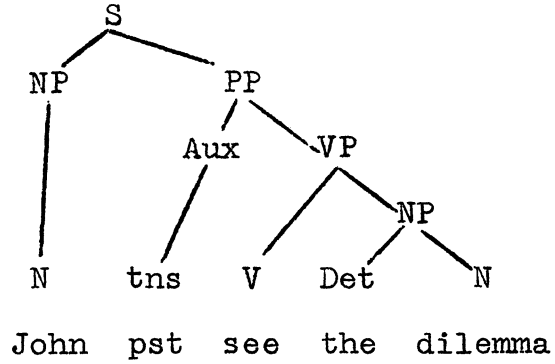
   c. Adjunction (attaching elements to nodes of a tree).

Transformational Rules (Cont'd)

4. Transformations are not all obligatory. Some transformations apply optionally. The obligatory rules apply uniformly to all strings and thus cannot be said to have semantic effect. Optional rules are free to apply or not apply in all trees designated by their structural indices (cf. 6 below). Two sentences which differ only in the fact that an optional rule applied in the derivation of one but not of the other should be paraphrases, since on the present view, the semantic component does not take account of the transformations which apply in the derivation of a sentence. Thus optional transformations serve to relate paraphrases. Although Phrase Structure Expansion Rules have semantic effect to the extent that they contain optional alternatives, Transformational rules as presently conceived are to have no semantic effect (Katz and Postal, 1964).

5. One consequence of the constraint that Transformations can have no semantic effect is that the distinctions that determine whether a sentence will be a question, a command, or a statement, or whether a sentence will be active or passive or positive or negative, and the like -- these distinctions will be made in the phrase structure. Thus all these putative "sentence types" may be viewed as a part of the "Kernel". Furthermore, inasmuchas recursion is now the property of the phrase structure rules, and not of the transformations, the notion "Kernel" may at last have been emptied of all usefulness for transformational theory.

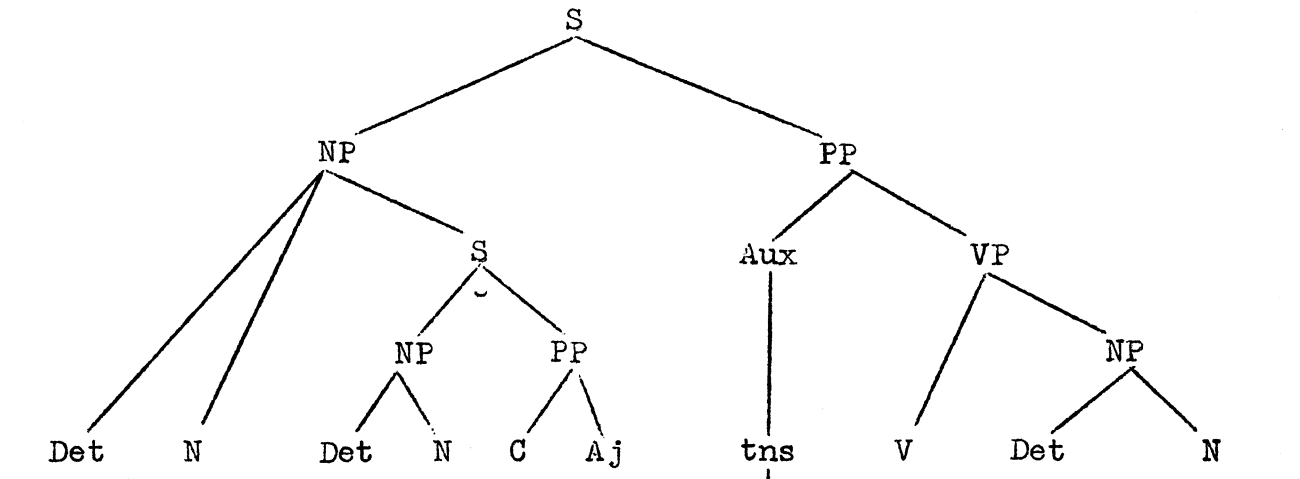
6. In (2) and (4) above, a transformation is said to apply to any tree designated by its structure index (or structural description). The structure index of a tree is an analysis of that tree into a string of exhaustive and non-overlapping constituents. Thus the following tree is <u>analyzable</u> into the following structural indices (or structural descriptions).



1. S
2. NP - PP
3. NP - Aux - VP
4. NP - Aux - V - NP
5. NP - tns - VP
6. NP - pst - V - NP
7. NP - Aux - V - Det - N
8. NP - tns - V - Det - N
9. N - PP
10. N - Aux - VP
11. N - X - V - Y
12. X - NP - Y
13. X - N - pst - V - NP - Y

. . .

Tree 1 (tentative deep structure)



⌜S , NP⌝ is a modifier of ⌜N , NP⌝

Rule 1:

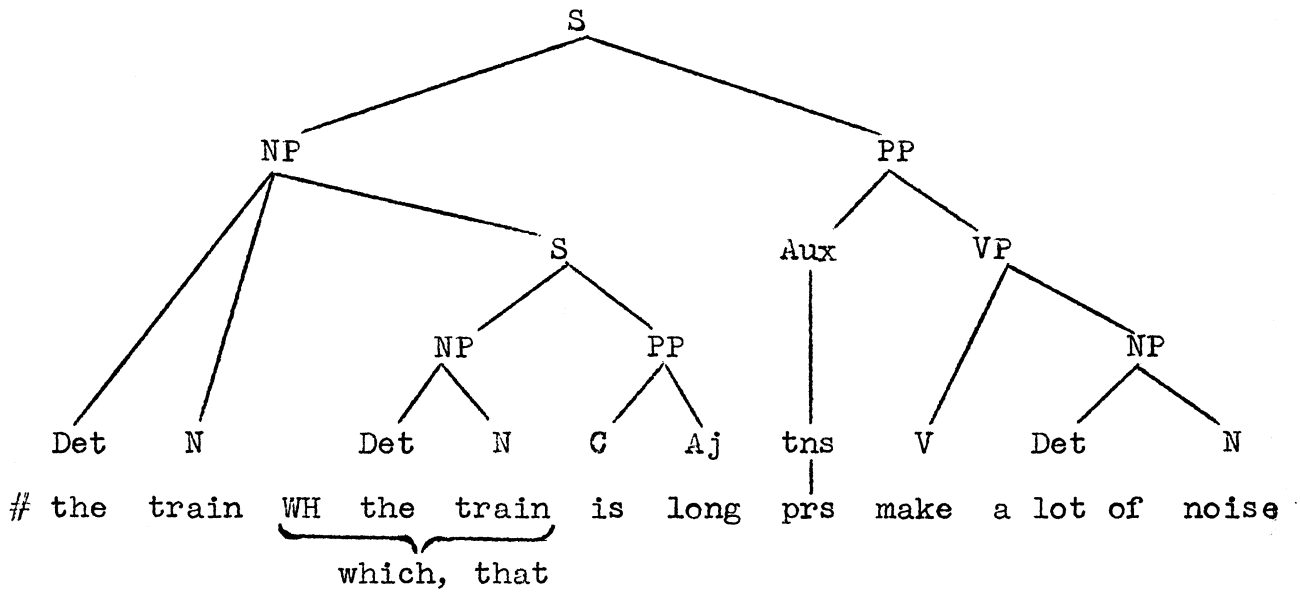
SD: # U + Det + N # X + Det + N + Y # Z #

1 2 3 4 5 6 7 8

SC: ---> 1 2 WH 5 4 6 8

Conditions: 2 = 5 and 4 5 6 is an S

Tree 2

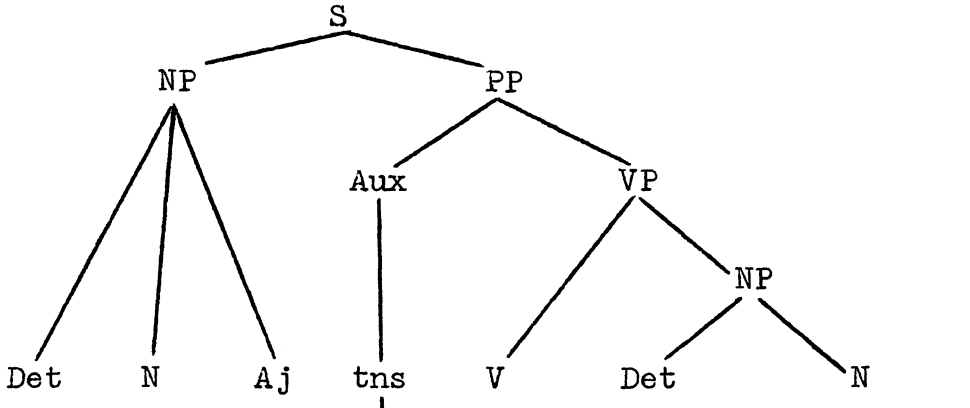


Rule 2: Relative Clause Reduction (a deletion rule) (optional)

SD: # X + Det + N + WH + Det + N + C + Y #
1 2 3

SC: ----> 1 3

Tree 3:



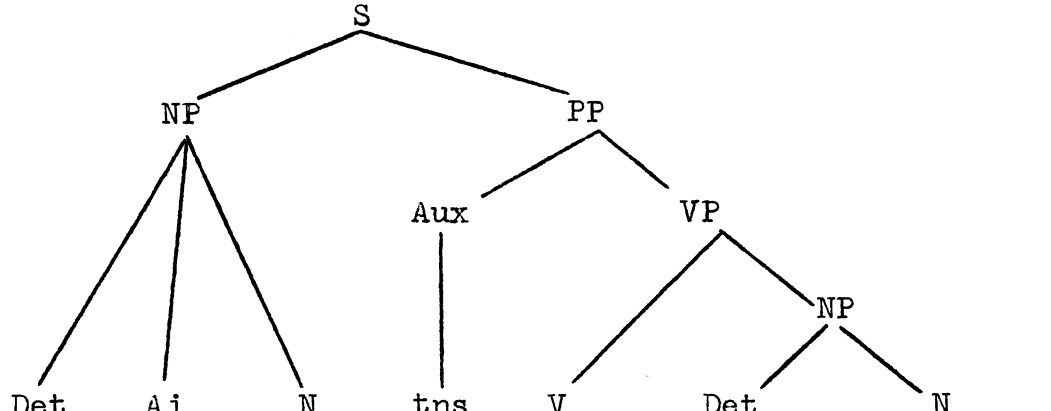
the train long prs make a lot of noise

Rule 3: Adjective Move (a permutation rule) (obligatory)

SD: # X + Det + N + Aj + Y #
1 2 3 4

SC: ----> 1 3 2 4

Conditions for application: 1 2 3 is an NP

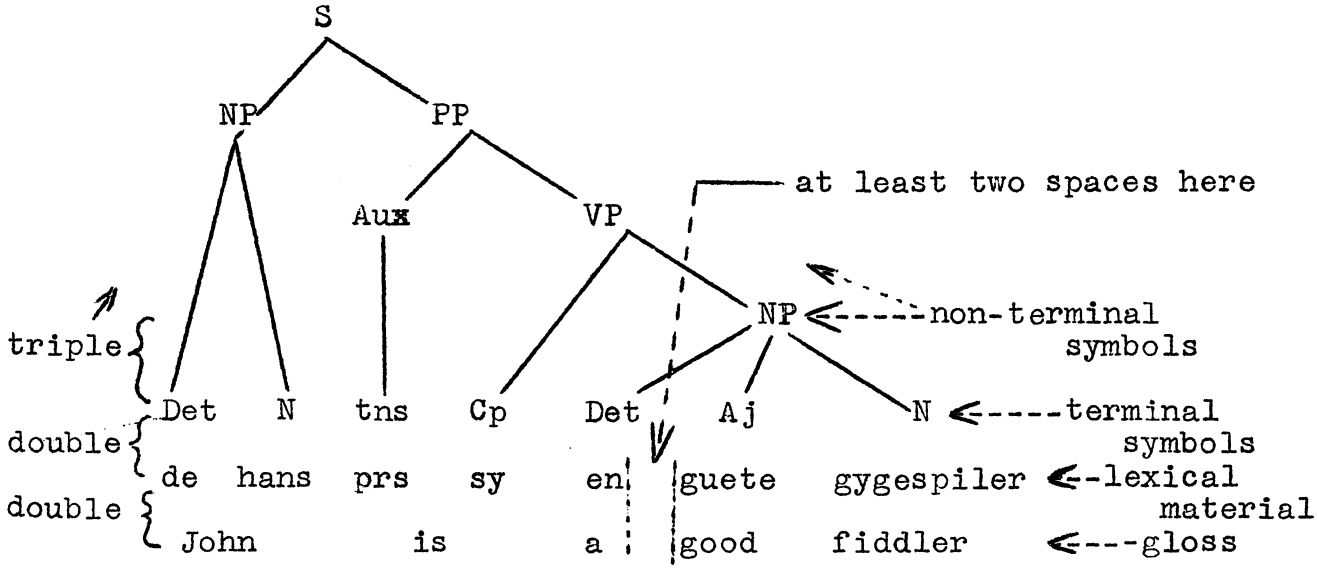


the long train prs make a lot of noise

Notes on How to Type up a Tree

The use of trees is recommended whenever they add to the clarity of your presentation. The following suggestions are intended to make the typing of trees a relatively simple matter.

1. Draw a tree free-hand on another piece of paper.



2. Trace the path through the tree(from the top node, S, to the terminal symbols)which passes through the greatest number of nodes (in this case it is the path: S, PP, VP, NP, N) and count the nodes on this path (in this case there are five).

3. Multiply the number obtained in (2) by three. The result in this case is fifteen. This is the number of lines you will need for your tree.

4. Select a line three spaces below the last line of text. Count down from this point the number of lines required for the tree (in this case 15). This will give you the line on which the lexical material should be typed. Roughly center the lexical material on the page allowing sufficient space between items to accomodate the lexical item, the terminal symbol that dominates it (and, where possible, the gloss that translates the lexical item as well) in a single centered column. Allow at least two spaces on the horizontal line between the longest symbols in adjacent columns. Each affix or grammatical formative for which there is a separate terminal symbol in the tree should be spaced as a separate column. Terminal symbols, lexical material and glosses are double spaced. Non-terminal symbols are at least triple spaced.

5. Start with the lexical material, center terminal symbols above the lexical items and work up the tree, centering each successively higher node on the string of elements it dominates. Last of all, connect the symbols with the appropriate branching structure

Charting of Variables in Grammatical Sub-Systems

A. Relative Clause: Head Noun Positions (Columns)
Shared Noun Positions (Rows)

	Subject	Object	Ind. Obj.	Prep. Phr.	...
Subject	The man who stole the horse ran away	I saw the horse that ran away	I gave the grain to the horse that ran away	I worked for the man who stole the horse	..,
Object	The horse that the man stole ran away.	I saw the horse that the man stole.	I gave grain to the horse that the man stole.	I looked for the horse that the man stole.	...
Ind. Obj.	The horse to which I gave the grain ran away	I saw the horse to which the man gave grain.	I gave grain to the horse to whom the man gave a shot.	I looked for the horse to which the man gave a shot.	...
	The horse which I gave grain to ran away.	I saw the horse which the man gave grain to.	I gave grain to the horse which the man gave a shot to.	I looked for the horse which the man gave a shot to.	...
Prep. Phr.	The man for whom I work stole the horse.	I saw the man for whom he worked.	I gave grain to the man for whom he worked.	I looked for the man for whom he worked.	...
	The man who I work for stole the horse	I saw the man who he worked for.	I gave the grain to the man who he worked for.	I looked for the man who he worked for.	...
.	.	.	.	.	
.	.	.	.	.	
.	.	.	.	.	

Suspension points are used to indicate that the charting of noun positions may be extended as desired along both dimensions. This kind of charting may prove useful in checking the generality of certain transformations you may write. It may also suggest kinds of sentences for elicitation which would otherwise be overlooked.

Pike is probably the one to be credited with first seeing the usefulness of this kind of display for purposes of syntactic analysis.

B. Comparative Construction: Position in Sentence (Columns)
Non-Shared Elements (Rows)

	Predicate	Adverbial	Determiner	Adj.Vb. Comp.	Nom. Mod. . . .
Subj.:	Tom is taller than Bob (is).	Tom runs faster than Bob (does).	More cats came than dogs.	Tom washed it cleaner than Bob.	Tom is a better student than Bob.
Obj.:		Tom likes milk more than tea.	They kill more cats than dogs.	Tom washed this cleaner than that.	Kodak makes better film than cameras.
Ind. Obj.:		Tom gave the key to Sue sooner than (he gave it) to Pete.	They give more serum to adults than (they do) to babies.		Tom gave a better key to Sue than (he did) to Pete.
Verb:	? Tom is ? taller than he ? seems ?	Tom runs faster than he crawls.	More men came than stayed for dinner.	Tom washed ? it cleaner than he scrubbed it.?	Tom is a ? better student than he seems. ?
Aux:	Tom could be taller than he was.	Tom ran faster than he ever has.	(would have) He/had to study many hours more than he was able to.	He ought to be able to wash it cleaner than he did.	Tom should be a better student than he is.
Tns:	Tom is taller than he was.	Tom runs faster than he did.	They are killing more cats than they were.	Tom washes it cleaner than he did.	Tom is a better student than he was.
Super Ord. Comp.:	Tom is taller than you think.	Tom ran faster than I had expected.	More cats came than we had invited.	Tom washed it cleaner than we had hoped.	Tom is a better student than we had been led to believe.
Adj. Comp.:	John is easier to obey than to please.			Tom pictured it more soiled with fat than yellow with age.	Tom is an easier student to entertain than to discipline.
Adj.: (Adv)	Tom is wider than he is tall.	(Tom ran more ploddingly than painfully.)			Tom is more of a careful worker than a fast one.

Examples of Frames Relevant to Subcategorization of

Syntactic Categories (Verbs)

1. Not all verbs take Direct Objects:

[___]	[___ NP]
John rejoiced.	*John rejoiced Sam.
Tom died.	*Tom died his cat.
Time elapsed.	*Time elapsed the book.
John itched all over.	*John itched the dog all over.
Slime oozed through the crack.	*Slime oozed the worms through the crack.
A ghastly noise issued from his mouth.	*A ghastly noise issued an announcement from his mouth.
*They issued yesterday.	They issued the hats yesterday.
*Bill junked.	Bill junked his car.
*John enjoyed.	John enjoyed the trip.
*Judy found.	Judy found the book.
*Jim put on the desk.	Jim put a finger on the desk.
*Tom will forgo.	Joe will forgo his lunch.
*He omitted.	He omitted the crucial example.
*John enraged yesterday.	John enraged the boss yesterday.
*Tom usually specifies for his wife.	John usually specifies roses for his wife.
*The interruptions frustrated.	The interruptions frustrated his plans for going to bed.
*The car rounded.	The car rounded the corner.
*John raised.	John raised his hand.
John rose.	*John rose roses.
*John set on the shelf.	John set the vase on the shelf.
John lies on the bed.	*John lies the book on the bed.

2. Not all verbs take Indirect Objects:

[___]	[___ IO]
John enjoyed the play.	*John enjoyed her the play.
Tom believed the lie.	*Tom believed him the lie.
He drove the car.	*He drove her the car.
John washed the dishes.	*John washed him the dishes.
*He paid a complement.	He paid her a complement.
*She wished luck.	She wished him luck.
*She showed the door.	She showed him the door.
The machine perforated it.	*The machine perforated it to him.
He peeled potatoes.	*He peeled potatoes to her.
He came for advice.	He came to her for advice.
She looked for comfort.	She looked to him for comfort.
?He offered a glass.	He offered her a glass.
?She bade farewell.	She bade him farewell.
?He gave a second glance.	He gave her a second glance.

Examples of Frames Relevant to Subcategorization of

Syntactic Categories (Verbs, Cont'd)

3. Not all verbs take the Passive Auxiliary:

[___]	[Pass ___]
The book cost five dollars.	*Five dollars were cost by the book.
The class lasted two hours.	*Two hours were lasted by the class.
Bill resembles his father.	*His father is resembled by Bill.
The shirt became him.	*He was become by the shirt.
Bill became a dentist.	*A dentist was become by Bill.
John weighs 200 pounds.	*200 pounds are weighed by John.
The lion roared.	*It was roared by the lion.
The lion roared at the crowd.	The crowd was roared at by the lion.
The lion roared at the crowd.	*At the crowd was roared by the lion.
Tom underwent an operation.	?An operation was undergone by Tom.
Bill is a mail man.	*A mail man is been by Bill.
John had a cold.	*A cold was had by John.
He said that he could come.	*That he could come was said by him.
	It was said that he could come.
The gauge read 50 psi.	*50 psi. were read by the gauge.
The preacher married John and Mary.	John and Mary were Married by the preacher.
John married Mary.	*Mary was married by John.
The suit fitted Ted.	*Ted is fitted by the suit.
The tailor fitted Ted with a suit.	Ted was fitted with a suit by the tailor.
The woods swarmed with mosquitoes.	*The woods were swarmed with by mosquitoes.
John's ignorance resulted from his lack of training.	*John's lack of training was resulted from by his ignorance.
John's appetite corresponds to his size.	*John's size is corresponded to by his appetite.
It measured five inches in length.	*Five inches were measured by it in length.
The participants numbered thirty.	*Thirty were numbered by the participants.
He lacked a hat.	*A hat was lacked by him.
He was missing a tooth.	*A tooth was being missed by him.
He laughed at the picture.	The picture was laughed at by him.

Hypothesis to check: The same set of verbs that refuse Passive also do not take Manner freely.

Examples of Frames Relevant to Subcategorization of

Syntactic Categories (Verbs, Cont'd)

4. Not all verbs take That + S Complement: [____ That + S]

*He drove that she was here.	He hinted that she was here.
*He resembled that she came.	He knew that she came.
*He paid that he had failed.	He believed that he had failed.
*He refused that she died.	He remarked that she died.
Similarly for: desist, resist, polish, cannoe, can, drip, tempt, give, try, attempt, itch, hit, go, tour, talk, totter, drink, eat, light, last, rebell, chew,....	Similarly for: see, think, say, consider, decide, read, hear, notice, smell, feel, taste, assume, learn, discover, forget, understand, whisper, shout, retort, chide (someone), rebuke (someone), reply, detect, reveal, find out, deny, perceive, suggest, propose, command, insist, insist, demand, require, ... (underlined forms have complements in the subjunctive: He insisted that I come.)

5. Not all verbs take Benefactives: (for him --> him)

[____]	[____ Ben]
*He was tall for her.	She got a book for him.
*He was old for her.	He was too old for her.
*He was her too old.	She got him a book
*He weighed 97 pounds for her.	He weighed 97 pounds of potatoes for her.
*Bill resembled her his father.	
*Bill is her a mail man.	The sucker lasted him all day.
*The lion roared her.	The lion roared for her.
*John had her a cold.	John picked her an apple.
?*John had a cold for her.	John had an apple for her
*John had her an apply.	John sliced her a piece of bread.
*John married her Mary.	He looked her up the phone number.
*John lacked her a hut.	John lacked a hut for her.

6. Not all verbs take Direction Adverbs:

[____]	[____ Dir]
*He stayed toward the house. (O.K. as place, not Dir)	He ran toward the house.
*He slept north.	He flew north.
*He knew into the house.	He stumbled into the house.
*He understood for Tasmania.	He sailed for Tasmania.
*He lacked down the path.	He waddled down the path.
*He became through the window.	He looked through the window.

Examples of Frames Relevant to Subcategorization of Syntactic Categories (Verbs, Cont'd)

7. Not all verbs take Adjectives:

[___]	[___ Adj]
*He expected tall.	He was tall. (a)
*He knew angry.	He became angry. (b)
*He perceived sick.	He got sick.
*He ate green.	He turned green.
*He itched black.	He made his face black.
*He lasted clean.	He washed the window clean.
*He estimed deep.	He dug the hole deep.
*He paid him white.	He designed the building tall.
*He told him short.	He painted the fence white.
	He cut her hair short.
	He stood tall.
	He ran scared. (Man?)
	He went away sad.
	The engine ran hot.
	The door stood ajar.
	The book lay open on the table.
	The doll lay broken on the floor.
	The child sat weeping on the sofa.
	He squatted there sucking his thumb.
	He ran past the door screaming at the top of his voice.
	He walked out the door shaking his fist.
	He seemed delighted.
	He appeared happy.
	He felt clean.
	He considered Bill tall.
	He ate the fruit green.

8. Not all verbs take Manner Adverbs: (in a ___ manner --> ___-ly)

[___]	[___ Man]
*It cost him $5 in a rapid manner.	He roared loudly at the passers by. (in a loud manner)
*It looked bad in a vicious manner.	He wandered through the crowd in an aimless manner.
*It tasted salty in an incoherent manner.	He talked incoherently to his accusers.
*It was quickly a long day.	They arrived quickly at the decision.
*He had an appl soundly.	He slept soundly in that bed.
*He resembled his father silently	He tip-toes silently by.
*He measured five feet tall in an angry manner.	He replied to the accusation in an angry manner.

Features vs. Subscripts: Two Solutions to the Subcategorization Problem

The following two sets of rules accomplish the same task. It is instructive to consider their relative complexity.

I. Subscripting Solution:

A. Rules of the Base:

$$VP \longrightarrow \begin{cases} V_{tr} + NP \\ V_{triot} + NP + IO \\ V_{triotben} + NP + IO + BEN \\ V_{trman} + MAN \\ V_{trrate} + RATE \\ V_{trmanrate} + MAN + RATE \\ V_{triotman} + NP + IO + MAN \\ V_{triotrate} + NP + IO + RATE \\ V_{triotmanrate} + NP + IO + MAN + RATE \\ V_{inben} + BEN \\ V_{inman} + MAN \\ V_{inbenman} + BEN + MAN \end{cases}$$

(Note how the subscripts redundantly reflect the frames in which V occurs.)

B. Rules of the Lexicon:

V_{tr} --->	give, buy,...	$V_{triotman}$ -->	give, ...
V_{triot} --->	give, ...	$V_{triotrate}$ -->	give, ...
$V_{triotben}$ --->	give, ...	$V_{triotmanrate}$ -->	give, ...
V_{trman} --->	give, buy,...	V_{inben} -->	give, buy,...
V_{trrate} --->	give, buy,...	V_{inman} -->	give, buy,...
$V_{trmanrate}$ --->	give, buy,...	Vinbenman -->	give, buy,...

(Note how the lexical rules redundantly converge upon a very few sets of lexical items.)

Features vs. Subscripts: Two Solutions to the Subcategorization Problem (Cont'd)

II. Syntactic Feature Solution:

A. Rule of the Base:

VP -----> V (NP) (IO) (BEN) (MAN) (RATE)

(Note that when the redundant subscripts are omitted the equivalent of twelve rules may be collapsed to this rather simple abbreviation.)

B. Rules of the Lexicon:

give, [+V, +[--- NP (IO (BEN)) (MAN) (RATE)]]

[+V, +[--- (NP + IO) BEN (MAN)]]

buy, [+V, +[--- NP (BEN) (MAN) (RATE)]]

[+V, +[--- (BEN) (MAN)]]

(Note that wholesale convergence seems to be eliminated along with the subscripts. In its place we will have wholesale repetition of the elements of which contextual features are composed. The dramatic saving which may seem to have been effected is partly illusory.)

Selection and Strict Subcategorization in Noun - Determiner Constraints

In previous lessons it has been shown that nouns are subcategorized in frames according to whether or not they can occur with plural, with sentence complement, with both, or with neither. There are, however, certain other kinds of constraints between nouns and determiners that are not easily formulated in terms of categorial contexts:

		milk			*a milk
1.	John has	*nail	4.	John has	a nail
		*idea			an idea
		the milk			*the milks
2.	John has	the nail	5.	John has	the nails
		the idea			the ideas
		some milk			*some milks
3.	John has	*some nail	6.	John has	some nails
		*some idea			some ideas
		*milks			
7.	John has	nails			
		ideas			

	Count		Mass
	Sing.	Pl.	
Definite	The This	The These	The This
Indefinite	A	∅ Some	∅ Some

Note that the features used here are intersecting and not hierarchic. Mass nouns seem to take the same definite determiners as singular count nouns but mass nouns also seem to take the same indefinite determiners as plural count nouns. Mass nouns and count nouns are not distinguished on the presence or absence of determiners. Since plural is not always marked in count nouns, neither the frame /Det ---/ nor the frame /--- Pl/ will serve to subcategorize nouns strictly into the two categories, count and mass. That count nouns accept plural where mass nouns refuse it can account for (5) - (7) above. Contextual features do not, however, easily account for (1) - (4).

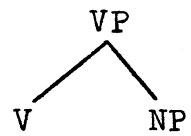
Selection and Strict Subcategorization Contrasted

Strict Subcategorization

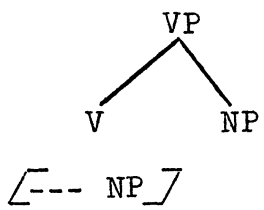
The contexts in terms of which rules perform subcategorization consist of syntactic category symbols (such as NP, VP, N,...).

The relevant contexts are specified by reference to frames in deep structure.

This kind of subcategorization formalizes the constraints on the substitutability of lexical items within a given frame as they are imposed by the co-occurring constituents of that frame.



Rule a: V --> C.S.



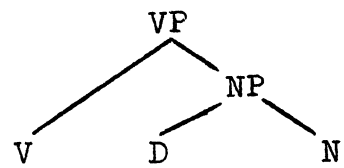
Rule (a) subcategorizes V as a transitive verb (i.e., the lexical rule will substitute for V in the frame defined by this VP (/--- NP/) only those verbs which take objects.)

Selection

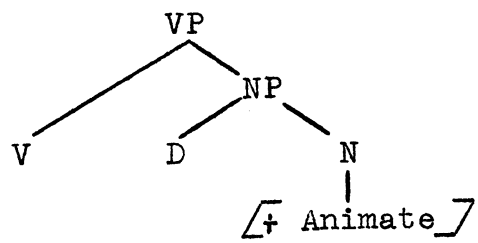
Contexts in terms of which rules perform subcategorization are either null (as in the case of inherent features) or they consist of inherent syntactic feature (as in the case of contextually governed features).

Contexts are defined between specific positions within a sentence.

This kind formalizes the constraints on the substitutability of lexical items in a given position within the sentence as these constraints are imposed by the syntactic relations into which that position enters within the sentence.



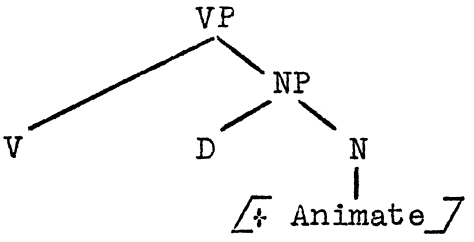
Rule b: N --> /± Animate/



Rule (b) optionally assigns to N the inherent (i.e., non-contextually determined) feature, /+ Animate/. Thus the lexical rule can replace N only with some noun which is not specified in the lexicon as /+ Animate/. This illustrates the case of subcategorization by selection

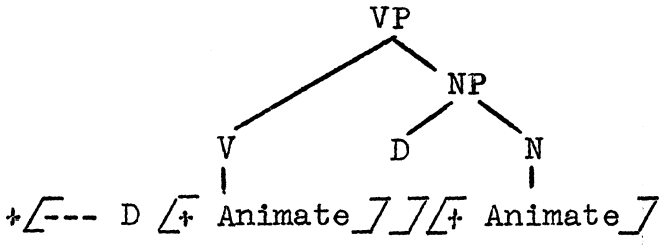
Selection

rules with reference to a null context.



Rule c: V --> C.S. / ___ D + @

(where @ is a N)



Rule (c) obligatorily assigns to V the contextually determined feature, +[--- D [+ Animate]]. It is intended that the rule be formulated in such a way as to hold only between verbs and their objects. A more detailed specification of context will probably be required. One this subcategorization rule has applied, the lexical rule can replace V only with some verb which is not specified in the lexicon as +[--- D [+ Animate]] (i.e., with some verb that accepts animate objects.) This illustrates the case of subcategorization by selection rules with reference to inherent features of the context.

Selection and Strict Subcategorization in Verb - Object Constraints

The following sentences are intended to illustrate a constraint that exists between verbs and their objects with respect to an inherent feature of nouns: [+Animate]

John { surprised / scared / amused / tickled / enraged / alarmed / appeased / befriended / tantalized } the { dog / *knife }

John { bent / sharpened / polished / soldered / chipped / chrome-plated / honned / stropped / assembled } the { *dog / knife }

John { saw / hit / trusted / threw / respected / feared / wanted / played with } the { dog / knife }

Match the following lexical entries with the appropriate set of sentences:

[+V, +[--- NP], +[---D[+Animate]]]

[+V, +[--- NP], +[---D[-Animate]]]

[+V, +[--- NP]]

Which of the following pairs of verbs will have <u>distinct</u> lexical entries?

a. surprise : bend

b. amuse : tickle

c. hit : polish

d. want : trust

e. befriend : sharpen

f. throw : chip

g. appease : strop

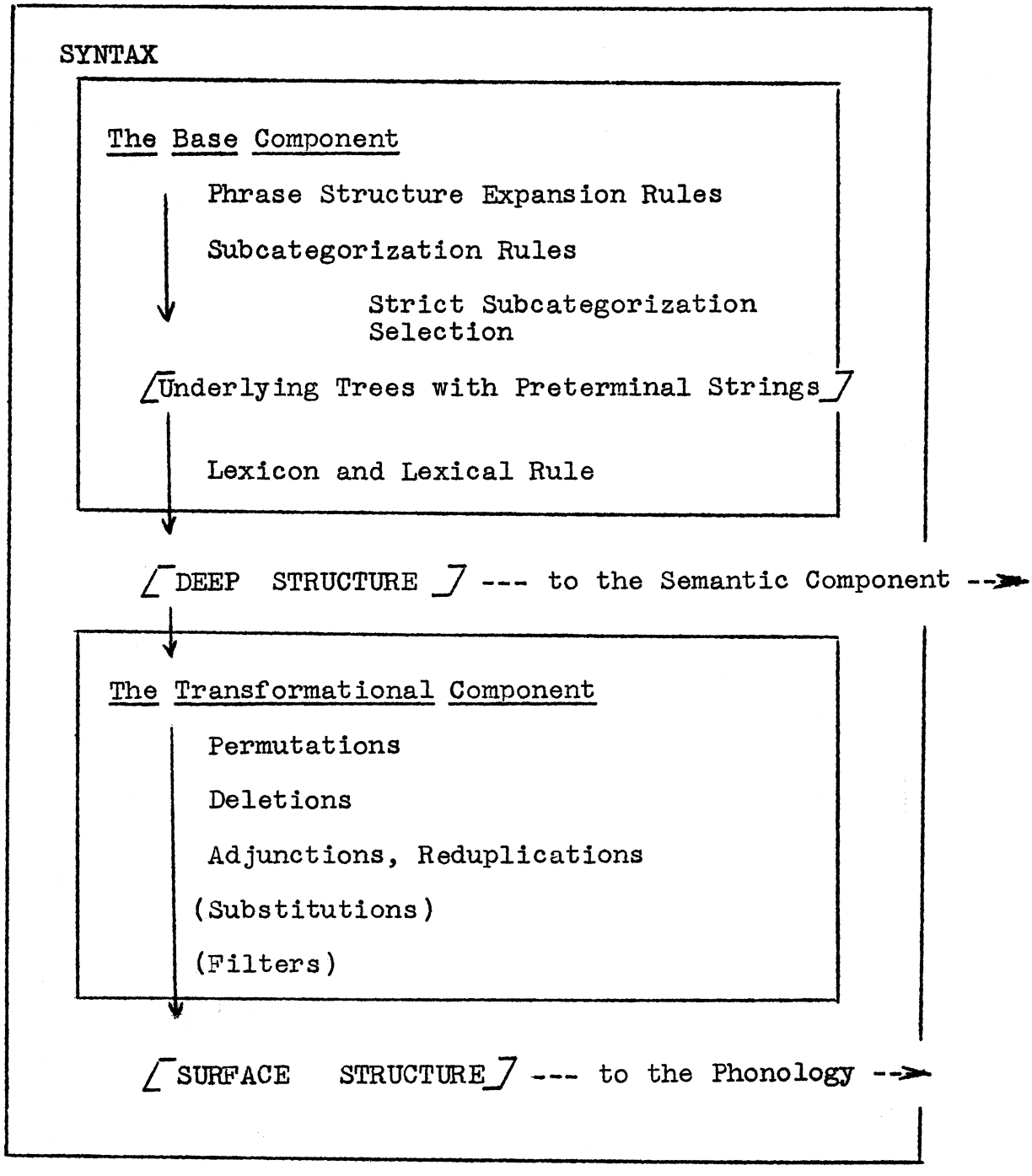
h. fear : see

i. chrome-plate : respect

j. bend : sharpen

An Illustrative Splinter from English Syntax

The purpose of this splinter is to exemplify the various types of rules which occur in the syntax, to show how each type applies in the derivation of a sentence and to discuss the peculiar properties of each. The rules given will exemplify the various parts of the following schematic representation of the syntactic component. Items in brackets are labels for the kinds of representation a sentence gets at the various stages of a derivation.



I. The Base of the Syntactic Component.

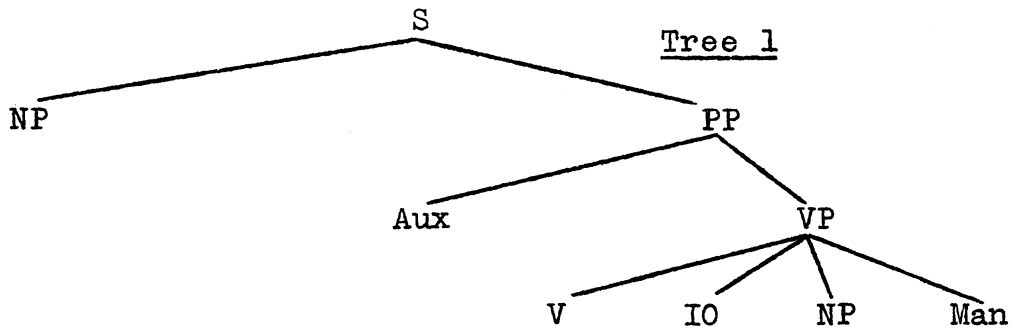
The rules of the base will be presented in what may tentatively be regarded as their normal order within the grammar. Various stages in the derivation of a particular sentence will be illustrated by means of trees. Each type of rule will be briefly discussed shortly after its first appearance.

1. S --> NP + PP

2. PP --> Aux + VP (Time) (Place)

3. VP --> { Cp + Pred ; V { (IO) (NP) (Ben) (Man) ; S' ; Pred } }

Possible configuration of the tree after the application of rule (3):



Rules (1) - (3) are Phrase Structure Expansion (PSE) Rules. They serve to assign branching structure by rewriting single category symbols as strings of symbols. The basic form of such rules is:

$$A \rightarrow Y \;/\; X \_\_ Z$$

(read: "A is rewritten as Y in the environment X ___ Z.") where A is a single symbol and Y is some non-null string of symbols. If either X or Y is specified as some string of symbols, the rule is said to be context sensative. Otherwise (i.e., where X and Y are both null) the rule is said to be context free. Rules (1) - (3) are context free. PSE rules apply obligatorily whenever they can apply, although they need not apply in the same way on every application since a given PSE rule may contain several options for the expansion of a given category. Braces: { }, enclose

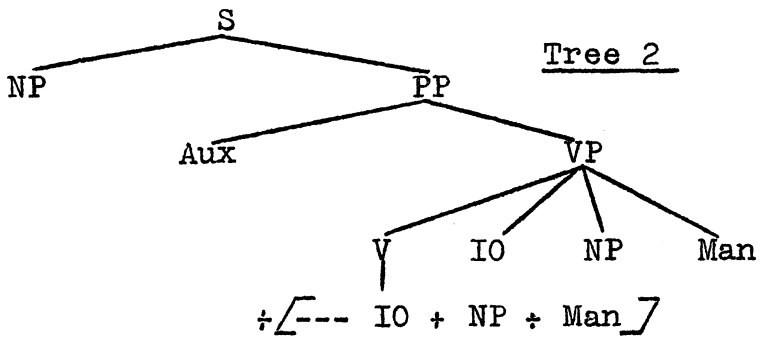
alternative (mutually exclusive) expansions of a category. Parentheses: ( ), enclose optional constituents of a given category. PSE rules apply only to nodes in a tree which have not been expanded by the application of some previous PSE rule.

PSE rules produce trees that mark grammatical relations in a uniform manner, so that, for example, the subject of a sentence in an underlying tree may be defined as /NP , S/ (read, "The noun phrase dominated immediately by S."). PSE rules also serve to generate the frames which may be used to define the domain of strict subcategorization for elements of the pre-terminal string.

4. Pred --> { Adj / (like) NP }

5. V --> C.S.

Tree after rule (5):



Tree 2

÷/--- IO + NP ÷ Man/

Rule (5) is a Strict Subcategorization (SSC) Rule. Since this rule has access to expanded as well as to unexpanded nodes in the tree, it is said to have transformational power. Rule (5) is to be read: "Assign to V its (strict subcategorial) complex symbol." The strict subcategorial complex symbol for any category may be determined in the following way: (1) Find the node in the tree which is to be subcategorized. (2) Find the node which immediately dominates the node to be subcategorized. (3) Find the string of unexpanded symbols dominated by this node. (4) This string, once the element to be subcategorized has been replaced in the string by a line: --- , constitutes the "frame" for the subcategorization of the category. When enclosed in brackets and preceded by a concatenation symbol, ÷ , the "frame" constitutes the strict subcategorial complex symbol.

SSC rules perform subcategorization in terms of syntactic category symbols (such as NP, VP, N, ...). The contexts relevant to strict subcategorization are defined by reference to "frames" in deep structure. This kind of rule formalizes the constraints on the substitutability of lexical items within a given frame as these constraints are imposed by the cooccurring constituents of that frame. Thus, rule (5) subcategorizes V as a transitive verb that takes both an indirect object and a manner adverb.

6. IO --> to + NP

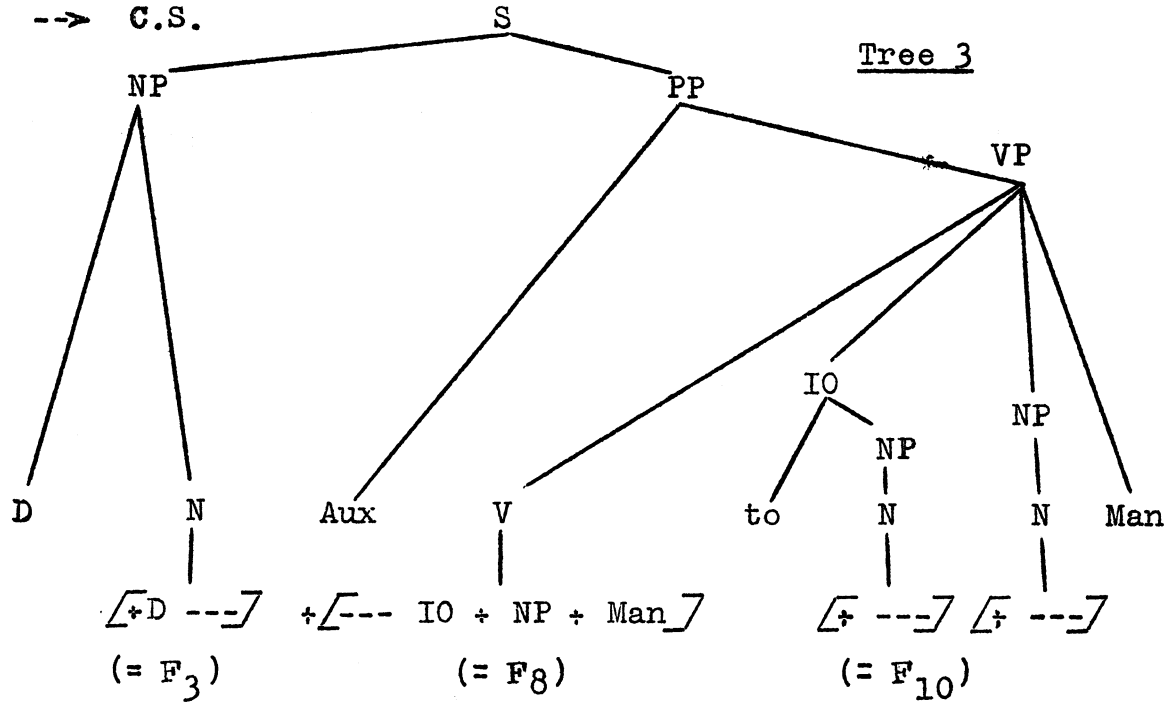
7. Ben --> for + NP

8. NP --> (D) N (S')

9. N --> C.S.

Tree after rule (9):

Tree 3



Rule (8) is the PSE rule which defines the frame for the strict subcategorization of nouns. Four subcategories are set up in this way: Proper nouns, /+ ---/, Common nouns, /+D ---/, nouns that take sentential complements (The idea that he should go is absurd.), /+D --- S'/, and the impersonal complement (It occurs to me that I forgot my wallet, from, It + S occurs to me.), /+ --- S'/.

10. Man --> { by + Pass / : / : }

11. Aux --> Ps (M) (Parf) (Prog)

12. Perf --> have + en

13. Prog --> { be / keep } + ing

14. Pass --> $\left\{\begin{matrix}\text{be}\\ \text{get}\end{matrix}\right\}$ + en

15. [+D ---] --> [± Count]

16. [+ Count] --> [± Animate]

17. [+N, + ---] --> [± Animate]

18. [+ Animate] --> [± Human]

19. [- Count] --> [± Abstract]

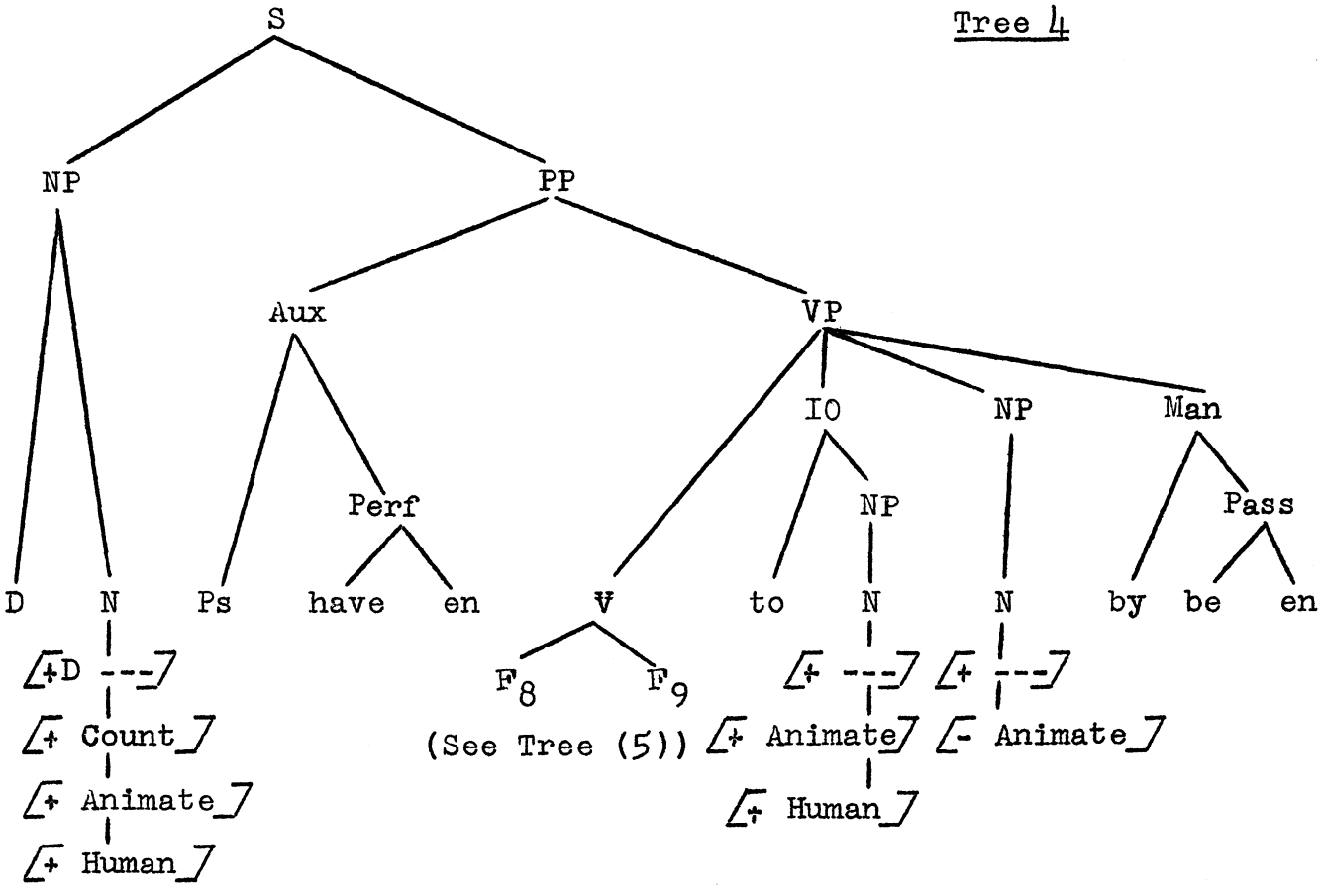
Rules (15) - (19) are Context Free Subcategorization Rules. They serve to assign inherent features to nouns and other categories.

20. [+V] --> C.S. / a Aux --- ((IO) (D) b)

where a is a N
and b is a N

Tree after rule (20):

Tree 4



Rule (20) is a Selection (S) Rule. An S Rule is a context-sensative rule that defines contexts relevant to the subcategorization of the verb (or of some other category) in terms of syntactic relations between elements in specific positions in a sentence. Rule (20) may be read, "Assign to V its (selectional) complex symbol, consisting of the features (a) of the noun subject, Aux --- (IO) (D) and the features (b) of the noun object if there is a noun object."

The contexts in terms of which selection rules perform subcategorization consist of inherent syntactic features and the syntactic categories of the context required to specify the relevant positions within the sentence.

21. [+ Count] --> [± Singular]

For our purposes we may assume that number in the subject and in the object of a verb is irrelevant to selection of verbs. (Note, however, that this assumption may be false (*The child joined forces. vs.: The children joined forces., and, *The woods swarmed with a fly. vs.: The woods swarmed with flies.).) Number must, however, be assigned to nouns, since there are number agreements between nouns and their determiners(*These man vs., This man...) and between subjects and Ps (*These men is working. vs., This man is working.) It should be noted that while determiner - noun agreement can be accomplished in the base, subject - verb agreement must apparently be accomplished in the transformational component. It must, in fact, occur after the passive transformation has applied, since in the case of passives, number agreement must hold not between the Ps and the noun marked as subject in the base, but rather it must hold between Ps and the noun marked as object (or even in some cases, as indirect object) in the base.

22. D --> [± Definite]

23. D --> C.S. / --- a where a is a N

24. Ps --> { C.S. / ------c where c is a Time (adverb) ; [± Present] / elsewhere }

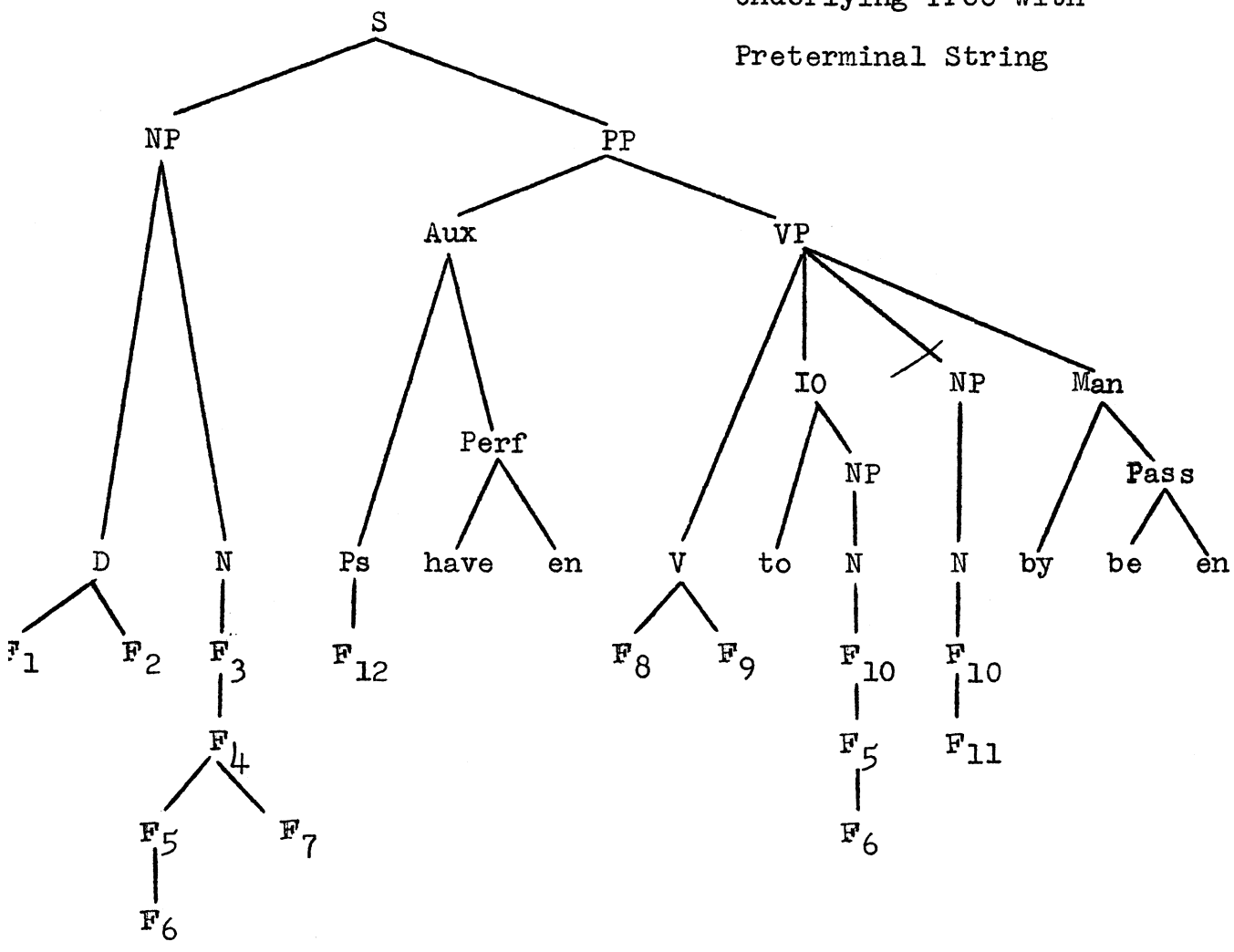
Rule (22) assigns an inherent feature to the determiner. Rule (23) effects agreement between determiners and their nouns with respect to number and subcategorizes determiners according to their cooccurrence with mass nouns, count nouns and the like. Rule (24) effects agreement between verbs and time adverbs with respect to tense. Where there are no time adverbs, tense is treated as an inherent feature of Ps.

Tree after rule (24):

Tree 5

Underlying Tree with

Preterminal String



F_1 : [+ Definite]

F_2 : [+ --- [+ Count][-Singular]...]

F_3 : [+D ---]

F_4 : [+ Count]

F_5 : [+ Animate]

F_6 : [+ Human]

F_7 ; [- Singular]

F_8 : [+ --- IO + NP + Man]

F_9 : [+[+ Animate][+ Human]Aux --- IO [- Animate]]

F_{10} : [+ ---]

F_{11} : [- Animate]

F_{12} : [- Present]

Lexical Rule: "If Q is a complex symbol of the preterminal string and (D,C) is a lexical entry, where C is not distinct from Q, then Q can be replaced by D." (Chomsky, 1965, 84)

Lexicon:

this [+D, +---[+ Count][+ Singular], [+ Definite]]

major lexical category — selectional contextual feature — inherent feature

[+D, +---[+ Count], [+ Definite]]

these [+D, +---[+ Count][- Singular], [+ Definite]]

a [+D, +---[+ Count][+ Singular], [- Definite]]

some [+D, +---[+ Count][- Singular], [- Definite]]

[+D, +---[- Count], [- Definite]]

the [+D, [+ Definite]]

ø [+D, +---[+ Count][- Singular], [- Definite]]

[+D, +---[- Count], [- Definite]]

child [+N, +D---, [+ Human][+ Singular]]

children [+N, +D ---, [+ Human][- Singular]]

note here that the inherent features [+ Count] and [+ Animate] may be predicted from the feature [+ Human] by reference to the hierarchy imposed upon the inherent features of nouns by rules (15) and (18) (P. 5, above).

Tom [+N, + ---, [+ Human][+ Singular]]

Bill [+N, + ---, [+ Human][+ Singular]]

Cuba [+ N, + ---, [- Animate][+ Singular]]

Lexicon: (Cont'd)

Texas [+N, + ---, [- Animate][+ Singular]]

baby [+N, +D ---, [+ Human]]

This entry indicates that this entry can be substituted either for a singular or a plural preterminal symbol. Number is determined by the feature specification of the preterminal symbol since regular phonological rules apply to the base form to yield the proper inflected forms. Two entries were given for child, children since no general phonological rule will give the inflected form.

man [+N, +D ---, [+ Human][+Singular]]

[+V, + --- NP (Man) ... , +[+ Human] Aux --- [- Human]]

Note that this form will substitute either for a noun or a verb of the preterminal string.

men [+N, +D ---, [+ Human][- Singular]]

may [+ M]

can [+ M]

must [+ M]

amuse [+V, + --- NP (Ben)(Man), + --- [+ Animate]]

sell [+V, + --- (IO) NP (Ben) (Man), +[- Abstract] Aux ---
(IO) [- Abstract]]

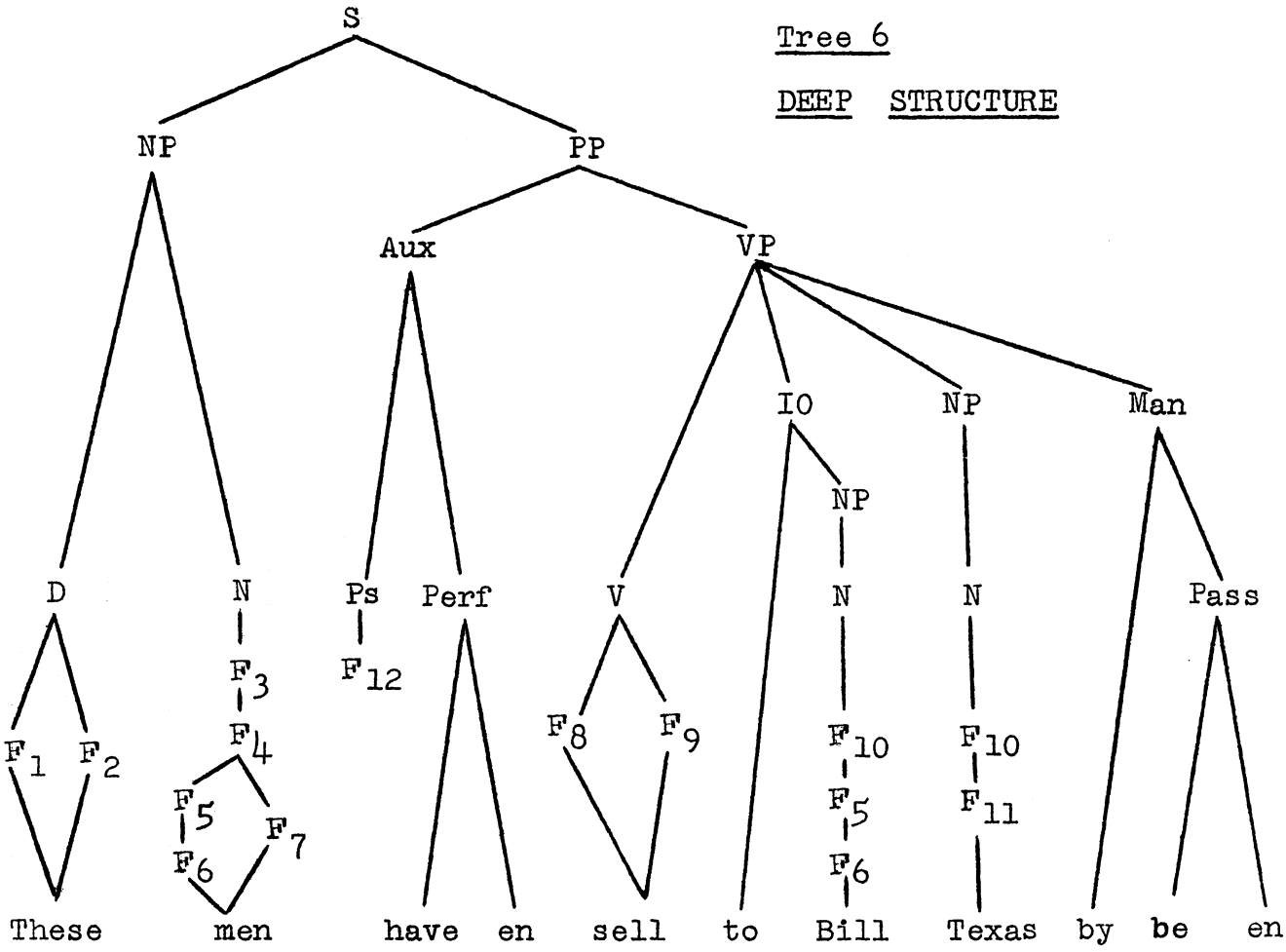
give [+V, + --- (IO) NP (Ben) (Man),]

buy [+V, + --- NP (Ben) (Man), +[+ Human] Aux ---]]

Tree after Lexical Rule

Tree 6

DEEP STRUCTURE



F_2 : [+ --- [+ Count][- Singular]]

F_9 : [+[- Abstract] Aux --- IO [- Abstract]]

All other features are as given for Tree (5). This representation (together with the semantic information also assigned by the lexicon) will provide the input for the semantic component. The semantic component will provide this sentence with its possible readings.

T - 2: Passive Transformation: (Obligatory Permutation and Adjunction)

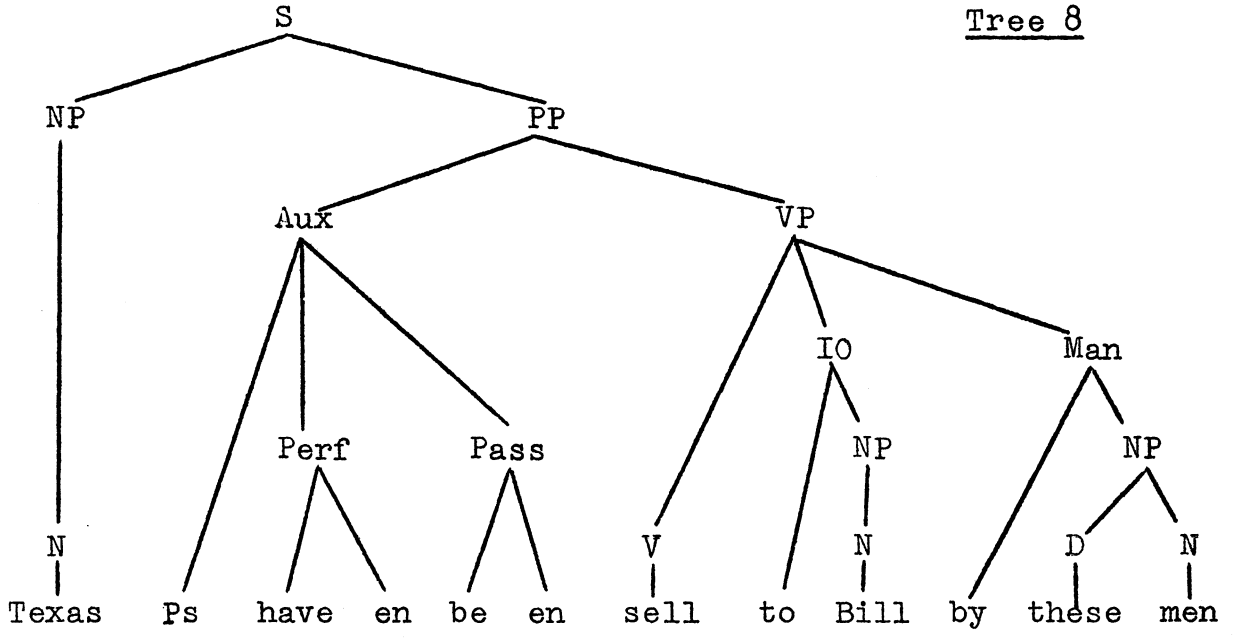
SD: NP , X $\langle \overline{U}$, $\_\rangle_{Aux} \langle \overline{V}$, NP , $\langle \overline{by}$, Pass, $\rangle_{Man} \rangle_{VP}$ Z

1 2 3 4 5 6 7

SC: 4 2 6 3 5 1 7

Assuming Tree (6) as input, the passive transformation yields the following tree (conservative convention):

Tree 8



On a less conservative convention for derived constituent structure, VP would have disappeared and everything that VP dominates immediately, would have been attached directly to PP.

Assuming Tree (7) as input, T - 2 may yield the following:

Tree 9