iv) *Phrase Structure Rules*

a) CP → (C) TP
b) TP → {NP/CP} (T) VP
c) VP → (AdvP+) V (NP) ({NP/CP}) (AdvP+) (PP+) (AdvP+)
d) NP → (D) (AdjP+) N (PP+) (CP)
e) PP → P (NP)
f) AdjP → (AdvP) Adj
g) AdvP → (AdvP) Adv
h) XP → XP conj XP
i) X → X conj X

v) ***Head***: The word that gives its category to the phrase.

vi) ***Recursion***: The possibility of loops in the phrase structure rules that allow infinitely long sentences, and explain the creativity of language.

vii) ***The Principle of Modification***: If an XP (that is, a phrase with some category X) modifies some head Y, then XP must be a sister to Y (i.e., a daughter of YP).

viii) ***Constituency Tests***: Tests that show that a group of words function as a unit. There are four major constituency tests given here: ***movement, coordination, stand alone,*** and ***replacement***.

FURTHER READING

Chomsky, Noam (1957) *Syntactic Structures*. The Hague: Janua Linguarum 4.
Chomsky, Noam (1965) *Aspects of the Theory of Syntax*: Cambridge: MIT Press.

GENERAL PROBLEM SETS

1. TREES: NPS, ADJPS AND ADVPS

[Application of Skills; Basic]
Draw the trees for the following AdjPs, AdvPs, and NPs:

a) very smelly
b) too quickly
c) much too quickly
d) very much too quickly
e) the old shoelace
f) the soggy limp spaghetti noodle *[assume* spaghetti = *Adj]*
g) these very finicky children

2. TREES II: ENGLISH PPS

[Application of Skills; Basic]
Draw the trees for the following English NPs and PPs:

a) The desk with the wobbly drawer
b) In my black rubber boots *[assume* rubber *is an Adj]*
c) That notebook with the scribbles in the margin
d) The pen at the back of the drawer in the desk near the bright yellow painting

3. SWEDISH NPS

[Application of Skills and Knowledge; Basic]
Consider the following data from Swedish. (If you speak Swedish, please confine yourself to this data, do *not* try to include definite forms, e.g., the umbrella.) You may wish to review Appendix A before attempting this problem. (Data courtesy of Sheila Dooley.)

a)	folk	"people"
b)	ett paraply	"an umbrella"
c)	tre paraplyer	"three umbrellas"
d)	ett äpple	"an apple"
e)	ett rött paraply	"a red umbrella"
f)	ett gult äpple	"a yellow apple"
g)	ett mycket fint paraply	"a very fine umbrella"
h)	ett gammalt fint paraply	"a fine old umbrella"
i)	ett rött paraply med ett gult handtag	"a red umbrella with a yellow handle"

1) Assume the Adv rule of Swedish is AdvP → Adv. What is the AdjP rule?
2) Are determiners obligatory in Swedish NPs?
3) Are AdjPs obligatory in Swedish NPs?
4) What is the PP rule for Swedish?
5) Are PPs obligatory in Swedish NPs?
6) What is the NP rule for Swedish?
7) Draw the trees for (g), (h), and (i)
8) Give the bracketed diagram for (f) and (i)

4. ENGLISH

[Application of Skills and Knowledge; Basic to Advanced]
Draw phrase structure trees *and* bracketed diagrams for each of the following sentences, indicate all the categories (phrase (e.g., NP) and word level (e.g., N)) on the tree. Use the rules given above in the "Ideas" summary of this chapter. Be careful that items that modify one another are part of the same constituent. Treat words like *can, should, might, was*, as instances of the category T (tense). (Sentences d–h are from Sheila Dooley.)

a) The kangaroo hopped over the truck.
b) I haven't seen this sentence before. *[*before *is a P,* haven't *is a T]*
c) Susan will never sing at weddings. *[*never *is an Adv]*
d) The officer carefully inspected the license.

e) Every cat always knows the location of her favorite catnip toy.
f) The cat put her catnip toy on the plastic mat.
g) The very young child walked from school to the store.
h) John paid a dollar for a head of lettuce.
i) Teenagers drive rather quickly.
j) A clever magician with the right equipment can fool the audience easily.
k) The police might plant the drugs in the apartment.
l) Those Olympic hopefuls should practice diligently daily.
m) The latest research on dieting always warns people about the dangers of too much cholesterol.
n) That annoying faucet was dripping constantly for months.
o) Marian wonders if the package from Boston will ever arrive.
p) I said that Bonny should do some dances from the Middle East.
q) That Dan smokes in the office really bothers Alina.
r) The belief that syntactic theory reveals the inner structure of sentences emboldened the already much too cocky professor.

5. BAMBARA

[Application of Skills; Basic]

Consider the following data from Bambara, a Mande language spoken in Mali. (The glosses have been slightly simplified.) Pay careful attention to the second line, where the word order of Bambara is shown. (Data from Koopman 1992.)

a) A kasira.
he cried
"He cried."

b) Den ye ji min.
child PAST water drink
"The child drank water."

c) N sonna a ma.
I agreed it to
"I agreed to it."

Answer the following questions about Bambara. Do not break apart words in your analysis.

1) Do you need a T category in Bambara?
2) Do you need a D category in Bambara?
3) What is the NP rule for Bambara? (You do not need any AdjP or PPs in the rule.)
4) What is the PP rule for Bambara?
5) What is the VP rule for Bambara?
6) What is the TP rule for Bambara? (Keep in mind your answers to the above questions; be consistent.)
7) Draw trees for (a), (b), and (c) using your rules.
8) Draw bracketed diagrams for (b) and (c).

6. HIXKARYANA

[Application of Skills; Basic/Intermediate]

Look carefully at the following data from a Carib language from Brazil (the glosses have been slightly simplified from the original). In your analysis do not break apart words. (Data from Derbyshire 1985.)

a) Kuraha yonyhoryeno biyekomo.
bow made boy
"The boy made a bow."

b) Newehyatxhe woriskomo komo.
take-bath women all
"All the women take a bath."

c) Toto heno komo yonoye kamara.
person dead all ate jaguar
"The jaguar ate all the dead people."

Now answer the following questions about Hixkaryana:

1) Is there any evidence for a determiner category in Hixkaryana? Be sure to consider quantifier words as possible determiners (like *some* and *all*).
2) Posit an NP rule to account for Hixkaryana. (Be careful to do it for the second line, the word-by-word gloss, in these examples not the third line.) Assume there is an AdjP rule: AdjP → Adj.
3) Posit a VP rule for Hixkaryana.
4) Posit a TP rule for Hixkaryana.
5) What is the part of speech of *newehyatxhe*? How do you know?
6) Draw the trees for (a) and (c) using the rules you posited above. (Hint: if your trees don't work, then you have probably made a mistake in the rules.)
7) Give bracketed diagrams for the same sentences.

7. DUTCH

[Application of Skills: Intermediate]

Consider the following sentences of Dutch. (Data from Ferdinand de Haan.)

a) De man in de regenjas is naar Amsterdam gegaan.
the man in the raincoat is to Amsterdam going
"The man in the raincoat is going to Amsterdam."

b) De man heeft een gele auto met een aanhanger gekocht.
the man has a yellow car with a trailer bought
"The man has bought a yellow car with a trailer."

c) De vrouw heeft een auto gekocht.
the woman has a car bought
"The woman has bought a car."

APPENDIX: HOW TO DO FOREIGN LANGUAGE PSR PROBLEMS

There are two kinds of non-English language problems found in syntax: those that provide a word-by-word gloss and those that don't.

A1. Doing problems with word-by-word glosses

Often, linguistic examples from languages other than English will take the following form (example from Sinhala – a language spoken in Sri Lanka; data from Lehmann 1978):

74) Jōn ballavə däkka ← *Actual language data*
John dog saw ← *Word-by-word gloss*
"John saw the dog." ← *Idiomatic translation*

There are three lines: the actual data, a word-by-word gloss and an idiomatic translation into English. Of these the most important for doing the problem set is the second line – the word-by-word gloss. The glosses are lined up word for word (and sometimes morpheme for morpheme) with the foreign language on the line above. This line tells you (1) what each word in the foreign language example means, and more importantly, (2) the order of the words in the foreign language. When trying to determine the phrase structure of a foreign language or the behavior of a word or phrase, this is the line to look at! (However, when drawing trees and citing examples in your answer it is considered more respectful of the language to use the actual foreign language words.) Remember: don't do an analysis of the idiomatic translation of the sentence, because then you are only doing an analysis of English!

Here's a more complete paradigm of Sinhala, along with a series of typical questions:

i) Jōn ballavə däkka
John dog saw
"John saw the dog."

ii) Jōn janēle iñdəla ballavə däkka
John window from dog saw
"John saw the dog from the window."

iii) Jōn eyāge taḍi ballavə däkka
John his big dog saw
"John saw his big dog."

a) Assume there is an AdjP rule: AdjP → Adj. What is the NP rule of Sinhala?
b) What is the PP rule of Sinhala?
c) What is the VP rule of Sinhala? (Assume all non-head material is optional.)
d) What is the TP rule of Sinhala?
e) Draw the tree for sentences (ii) and (iii).

The first step in analyzing a language like this is to determine the parts of speech of each of the words. Be very careful here, do not assume that because English has certain categories that the language you are looking at has the same categories; however, all other things being equal you can assume that there will be some parallels (unless we have evidence to the contrary):

i) Jōn ballavə däkka
John dog saw
N N V

ii) Jōn janēle iñdəla ballavə däkka
John window from dog saw
N N P N V

iii) Jōn eyāge taḍi ballavə däkka
John his big dog saw
N D Adj N V

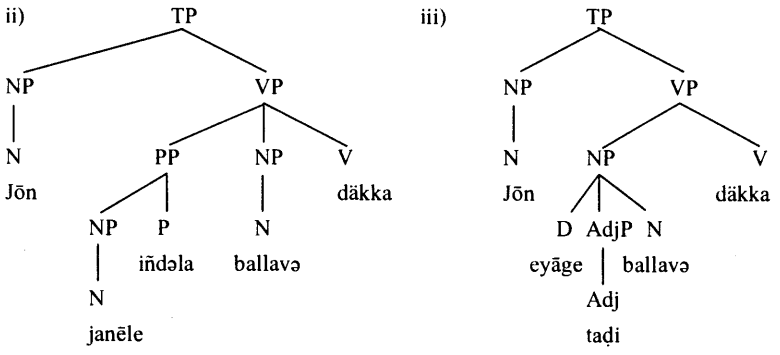
Next let's answer question (a). We can observe from sentence (i) that an NP in Sinhala (just like in English) can be an N by itself (e.g., *Jōn*). This means that anything other than the noun has to be optional. Consider now the sentence in (iii); from the literal English translation we can tell that the words meaning "big" and "his" modify the word "dog," and are thus part of the NP headed by "dog." We're told in (a) to assume that there is an AdjP rule (AdjP → Adj), and we are treating the word for "his" as a determiner. Thus it follows that the Sinhala NP rule is at least NP → (D) (AdjP) N. You'll notice that the order of elements in this rule is the same as the order of elements in the Sinhala sentence. You should also note that the PP meaning "from the window" does not modify the N, so is not part of the NP rule at this point. Since it modifies the V, it will be part of the VP rule.

Question (b) asks us about the PP rule. We have one P in the data – the word meaning "from" in sentence (ii). Pay careful attention here. This P appears between two nouns; but the noun associated with the P is the one meaning "window." This means that the P in Sinhala *follows* the NP; so the rule is PP → NP P. We have no evidence if the NP here is optional.

The VP rule is next in (c). Sentence (ii) is the most informative here. Looking at what would be in the VP in English, we have the PP meaning "from the window" and the NP meaning "dog." These both precede the V. This is true in sentences (i) and (iii) too. The PP is clearly optional, but there is no evidence in the data about whether the NP is or not. However, you are told to assume that "all non-head material is optional." So the rule is VP → (PP) (NP) V.

Finally we have the TP rule. Like English, the subject NP precedes the VP. So the rule is TP → NP VP. We have no evidence for a T node so we have not posited one.

Here are the trees for (ii) and (iii).



A2. Doing problems without word-by-word glosses

Sometimes you will be given data without word-by-word glosses, and only an idiomatic sentence translation. Take the following example from Welsh:

i)	Agorodd y dyn y drws.	"The man opened the door."
ii)	Collodd y dyn ddwy bunt.	"The man lost two pounds (money)."
iii)	Gyrhaeddodd y dyn.	"The man arrived."
iv)	Gaeth y dyn ddwy bunt.	"The man got two pounds."
v)	Agorodd Fred ddwy ddrws.	"Fred opened two doors."

Since word-by-word glosses are the most important part of a foreign language problem (see section A1), the first thing you have to do is develop a word-by-word gloss (or morphological analysis). To do this you compare and contrast the sentences in the data set, using the translation as a guide.

Let us do the above sentences as an example. First, look at the first four of the sentences, what words in the English gloss is common to them all? "The man". Now, look at the Welsh in the left column. What words are found in all of these sentences? *Y dyn*. There is a high probability that the Welsh words *y dyn* means "the man." We can deduce that *y* means "the" by looking at the other instance of *y* in sentence (i). Sentence (i) has two "the"s in it, and the Welsh has two *y*s. This means that *dyn* probably means man. We might even venture that *drws* means door. This appears to be consistent with the fact that sentence (v) has *ddrws* in it. Although *ddrws* and *drws* aren't identical, neither are their glosses: sentence (i) has the singular "door" in it, and sentence (v) has the plural "doors."[4]

Similarly by looking at sentences (ii) and (v) we can see that the only two words they have in common in both the English and the Welsh is *ddwy* "two." Hopefully the meaning of *Fred* is self-evident, but even if it weren't we could deduce it by process of elimination. The same is true of each of the verbs. Sentences (i) and (v) have in common the word *agorodd* and the gloss "open." We might suppose that initial position is where verbs like "open" go. This means that the first word in each of the other sentences is the verb. Alternately we could have deduced that these were the various verbs, based on the fact that we had meanings for all the nouns and determiners, so by process of elimination all that is left in each sentence is the verb.

Once you've done this morphological analysis, you are ready to tackle the rest of the problem as we did in section A1.

Ideas, Rules, and Constraints Introduced in this Chapter

i) ***Constituent***: A group of words that functions together as a unit.

ii) ***Hierarchical Structure***: Constituents in a sentence are embedded inside of other constituents.

iii) ***Syntactic Trees and Bracketed Diagrams***: These are means of representing constituency. They are generated by rules.

[4] You might be tempted to think that the *dd* is a plural marker. While consistent with the facts above, the *dd* is actually a result of a special morphophonological process triggered by *dwy* (*ddwy*) called a consonant mutation. Knowing this isn't necessary to solving the problem set.