YOUR NAME: REGISTRATION #:

(10 points)

(J) Plains Cree (1/3)

Cree is the most widely spoken of the Canadian aboriginal languages, with about 117,000 people speaking one of its many varieties. Here are six words in Plains Cree (Nēhiyawēwin), a dialect spoken across much of the Western Canadian prairie and in parts of Minnesota, written using the Roman alphabet:

tehtapiwin	"chair"	*mistikwan*	"head"
iskwahtem	"door"	*tipahikan*	"hour"
sakahikan	"nail"	*astotin*	"hat"

J1 (1 point). Below are six related words, meaning "little hat", "little nail", "little door", "little head", "minute", and "little chair". Which means which?

cipahikanis _____

miscikwanis _____

cehcapiwinis _____

sakahikanis _____

ascocinis _____

iskwahcemis _____

YOUR NAME: REGISTRATION #:

(J) Plains Cree (2/3)

J2 (4 points). Although Cree can be written in the Roman alphabet, it is more frequently written in a writing system known as "Syllabics". This writing system has been adopted by speakers of other Canadian aboriginal languages as well; Inuktitut Syllabics are in wide use, and speakers of Ojibwe (Anishinaabemowin), Blackfoot, and Carrier (Dakelh) have also written their languages in Syllabics.

The twelve words provided above in the Roman alphabet are given below (in random order) in Syllabics. Write their Roman alphabet equivalents in the blanks next to each word.

a. ᑎᐸᐦᐃbᐣ _____

b. ᐊᓀᒍᑎᓂᓀ _____

c. ᓴbᐦᐃbᐣ _____

d. ᒥᓀᑎbᐧᐣ _____

e. ᑭᐸᐦᐃbᓂᓀ _____

f. ᐃᓀbᐧᐦᑫᒥᓀ _____

g. ᓴbᐦᐃbᓂᓀ _____

h. ᑌᐦᑕᐱᐃᐧᐣ _____

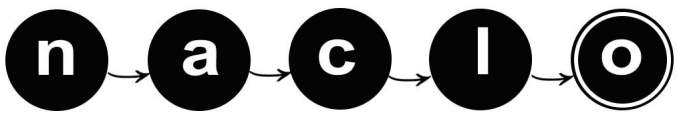
i. ᒥᓀᑭbᐧᓂᓀ _____

j. ᐃᓀbᐧᐦᑌᑦ _____

k. ᐊᓀᑐᑎᐣ _____

l. ᑫᐦᓚᐱᐃᐧᓂᓀ _____

Notes on pronunciation: When writing Cree in the Roman alphabet, the letter <c> represents the [ts] sound.



YOUR NAME: REGISTRATION #:

(J) Plains Cree (3/3)

J3 (5 points). Explain your answer.

2010 Solutions

(J) Plains Cree (1/3)

J1 (1 point). Below are six related words, meaning "little hat", "little nail", "little door", "little head", "minute", and "little chair". Which means which?

cipahikanis	minute
miscikwanis	little head
cehcapiwinis	little chair
sakahikanis	little nail
ascocinis	little hat
iskwahcemis	little door

J2 (4 points).

a. ᑎᐸᐦᐃᑲᓴ	tipahikan
b. ᐊᓀᔑᑎᓂᓀ	ascocinis
c. ᔉᑲᐦᐃᑲᓴ	sakahikan
d. ᒥᓀᑎᑲ·ᓴ	mistikwan
e. ᑭᐸᐦᐃᑲᓂᓀ	cipahikanis
f. ᐃᓀᑲ·ᐦᐣᒥᒥᓀ	iskwahcemis
g. ᔉᑲᐦᐃᑲᓂᓀ	sakahikanis
h. ᑌᐦᑕᐱᐃ·ᓴ	tehtapiwin
i. ᒥᓀᑭᑲ·ᓂᓀ	miscikwanis
j. ᐃᓀᑲ·ᐦᐣᑌᑦ	iskwahtem
k. ᐊᓀᑐᑎᓴ	astotin
l. ᒧᐦᓚᐱᐃ·ᓂᓀ	cehcapiwinis

2010 Solutions

(J) Plains Cree (2/3)

J3 (5 points). Explain your answer.
For the first part, the rule for forming the diminutive in Cree is to add an *–is* suffix at the end of the word and change ("mutate") every instance of <t> to <c>.

There are many logical routes through the first part, many of them very good. Here's one way, which requires making comparatively few assumptions about what individual symbols might mean. First, we notice that the twelve items can be paired up into six very similar pairs:

ᓴᑲᐦᐃᑲᓱ	⇔	ᓴᑲᐦᐃᑲᓯᓀ
ᒥᓀᑎᑲ·ᓱ	⇔	ᒥᓀᒋᑲ·ᓯᓀ
ᐊᓀᑐᑎᓱ	⇔	ᐊᓀᔑᒋᓯᓀ
ᑎᐸᐦᐃᑲᓱ	⇔	ᒋᐸᐦᐃᑲᓯᓀ
ᑌᐦᑕᐱᐃ·ᓱ	⇔	ᕽᐦᓱᐱᐃ·ᓯᓀ
ᐃᓀᑲ·ᐦᑌᕀ	⇔	ᐃᓀᑲ·ᐦᕽᒥᓀ

From the second column being longer, and all ending in the same symbol, we can be pretty sure these are the *–is* forms. (And that this writing s------ystem writes left-to-right.)

We can notice now that, disregarding the different endings for a moment, that each item from the first column is *almost*, but not quite, identical to its sister in the second column. The remaining difference is that every time one of { ᑎᑐᑌᑕ } appears in the first column, it is replaced by { ᒋᔑᕽᓱ } in the second – that is, just like in the Roman alphabet versions, a "mutation" is happening to make the derived form.

At this point it's simple to match the Roman pairs to Syllabics pairs based on *where* in the word these mutations occur. Each pair has a different pattern of mutation:

sakahikan ⇔ *sakahikanis* has no mutations,
as does ᓴᑲᐦᐃᑲᓱ ⇔ ᓴᑲᐦᐃᑲᓯᓀ
tipahikan ⇔ *cipahikanis* has one at the beginning,
as does ᑎᐸᐦᐃᑲᓱ ⇔ ᒋᐸᐦᐃᑲᓯᓀ
mistikwan ⇔ *miscikwanis* has one in the middle,
as does ᒥᓀᑎᑲ·ᓱ ⇔ ᒥᓀᒋᑲ·ᓯᓀ
iskwahtem ⇔ *iskwahcemis* has one towards the end,
as does ᐃᓀᑲ·ᐦᑌᕀ ⇔ ᐃᓀᑲ·ᐦᕽᒥᓀ

(J) Plains Cree (3/3)

tehtapiwin ⇔ *cehcapiwinis* has two at/towards the beginning,
as does ᑌᑊᑕᐱᐞᐣ ⇔ ᖁᑊᑲᐱᐞᓂᔅ
astotin ⇔ *ascocinis* has two towards the end,
as does ᐊᖢᑐᑎᐣ ⇔ ᐊᖢᔑᑎᓂᔅ

At this point, we can also do a number of checks as well to show the internal consistency of our answer – that our answer for *iskwahcemis* has the same sequence at the end as *mistikwan* and *miscikwanis* have at the beginning, that *sakahikan* and *tipahikan* have the same endings, etc.

The system that emerges is the following. The full-size symbols represent CV sequences; there is one per syllable. The shape of them represents the consonant, and the direction they are rotated represents the vowel.

	a	e	i	o
no consonant	ᐊ		ᐃ	
t	ᑕ	ᑌ	ᑎ	ᑐ
p	ᐸ		ᐱ	
c	ᒐ	ᖁ	ᒋ	ᒍ
k	ᑲ			
s	ᔑ			

You can see one pattern clearly between *t, p*, and no-consonant. There are two rotational patterns in Syllabics, actually, although it can't be concluded for certain just based on these data: asymmetrical symbols (like the <c> series) flip, but symmetrical symbols (like the <t> series) rotate. (Otherwise, if they flipped like the other series, you wouldn't be able to tell apart <ta> and <ti> or <te> and <to>.)

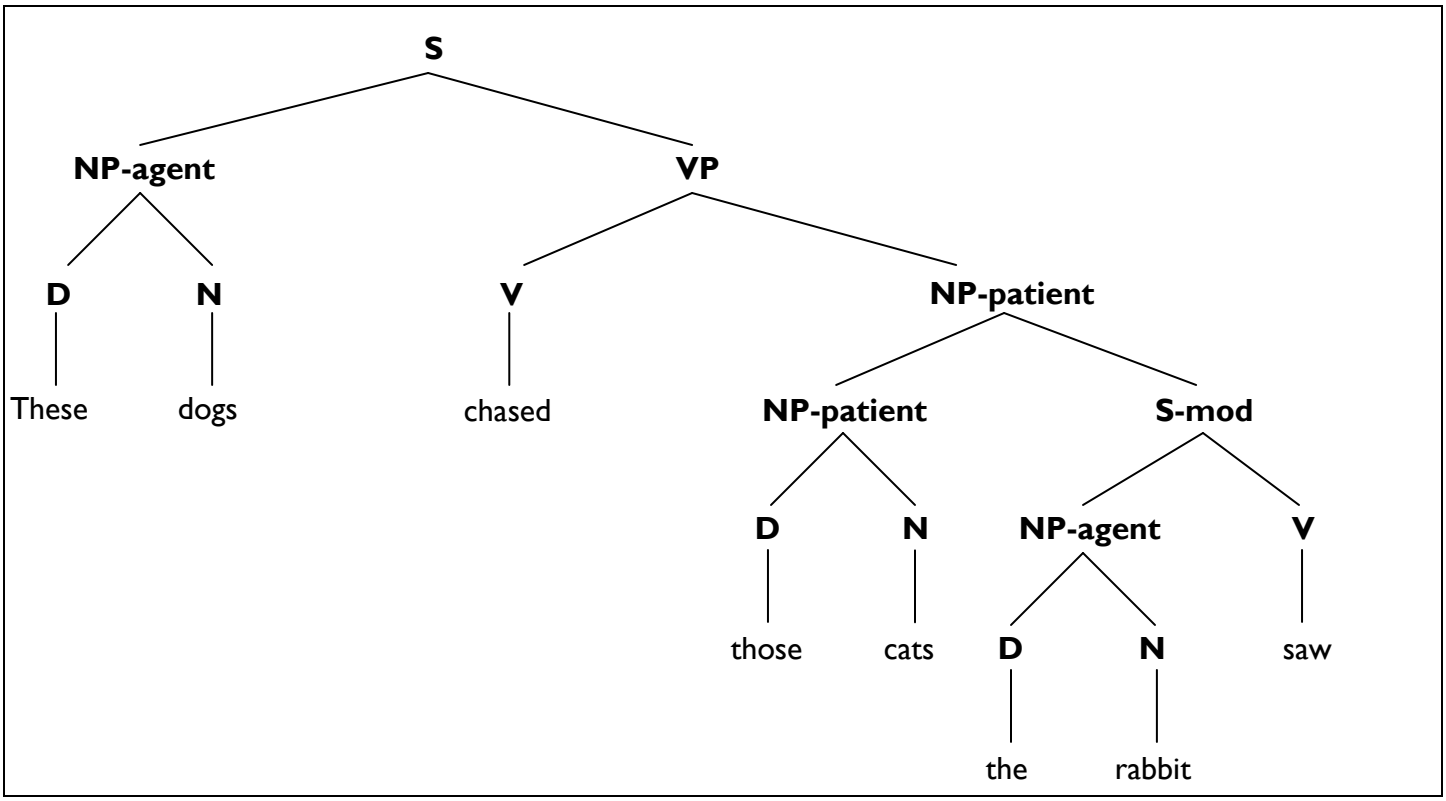
There is one full-sized character per syllable; characters not represented in this way are given superscript characters. <s>, <m>, and <n>, when not right before a vowel, are represented by ᐢ, ᐟ, and ᐣ,respectively. <h> is represented wherever it occurs by ᑊ -- if it occurs before a vowel, the ᑊ is used before the appropriate bare vowel character. <w>, when it occurs before a vowel, is represented by the dot · *after* the vowel; like *h*, if the syllable is just wV the dot is used before the bare vowel character.

YOUR NAME: REGISTRATION #:

(5 points)

(I) Dogs and cats on trees (1/5)

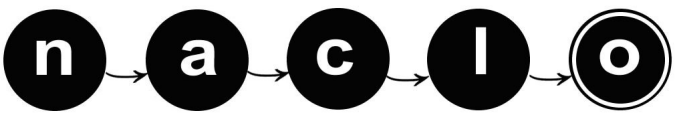
Linguists use diagrams called trees to represent the grouping of words within sentences. Here is a simple example from English:



The tree diagram shows that in the sentence "These dogs chased those cats the rabbit saw", *these* is most closely related to dogs, *those* most closely related to cats etc.

The abbreviations S, NP-agent, VP, etc. stand for different types of words or groups of words. These abbreviations and a few others we will use in this problem are spelled out here:

S: sentence
S-mod: sentence which functions as a modifier
NP-agent: noun phrase denoting the agent (initiator) of an action
NP-patient: noun phrase denoting the patient (undergoer) of an action
NP-location: noun phrase denoting the location of an action
N-agent: noun denoting the agent of an action
N-patient: noun denoting the patient of an action
N-location: noun denoting the location of an action
V: verb
V-mod: verb in a sentence which functions as modifier
VP: verb phrase

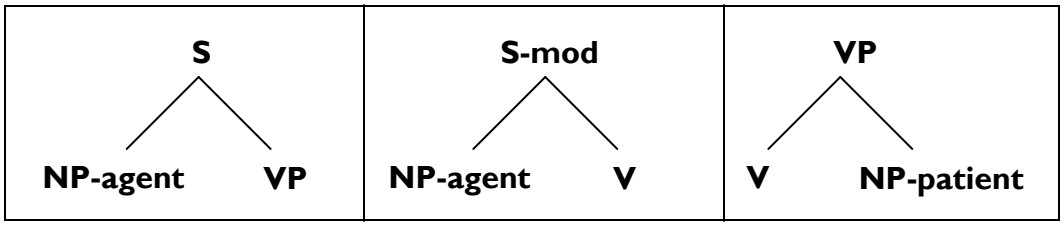


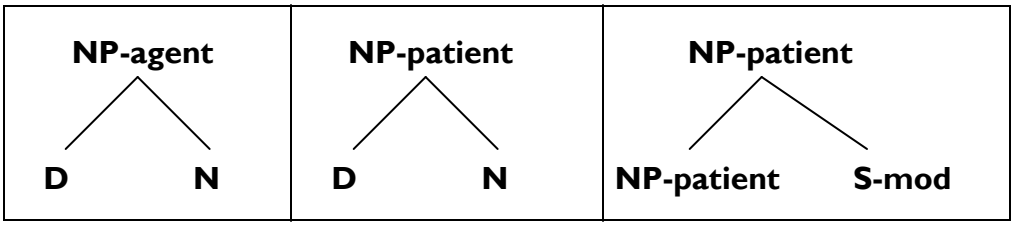
YOUR NAME: REGISTRATION #:

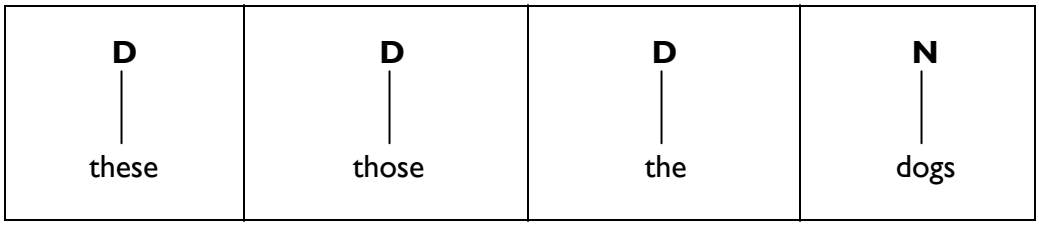
(I) Dogs and cats on trees (2/5)

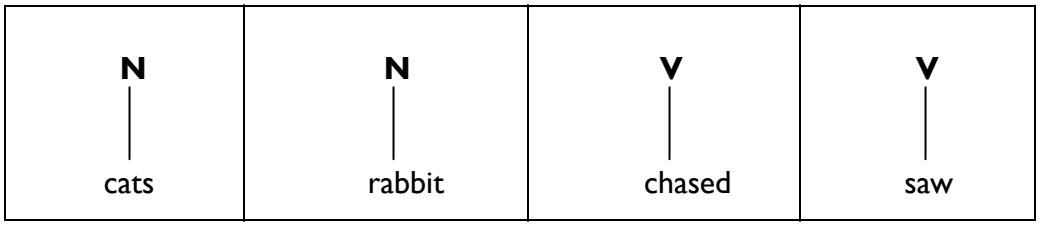
These labels give information about the part of speech of a word or group of words (e.g., noun, verb etc) as well as the role that that word or group of words plays in the meaning of the sentence.

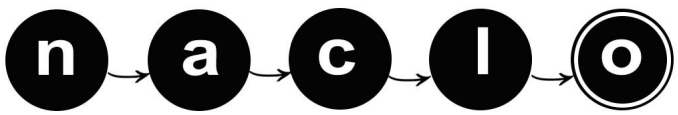
When working with trees, linguists write systems of rules (called 'grammars') which describe sets of trees. Each rule in the system is a building block. Any tree which can be constructed out of those building blocks is in the set of trees described by the grammar. For example, the tree given above for *These dogs chased those cats the rabbits saw.* requires the following building blocks or rules:











YOUR NAME: REGISTRATION #:

(I) Dogs and cats on trees (3/5)

I1 (3 points). Your first task is to translate the following sentences from Malayalam, a Dravidian language spoken by about 37 million people, primarily in India. There are two sources of information provided to you: a list of translations of the Malayalam words and a small grammar (set of rules) in the style above for Malayalam. Note that the set of abbreviations used in the Malayalam grammar is not the same as the set used in the English grammar. This is due to grammatical differences between the languages.

There is one twist, however. Some of these sentences are not actual Malayalam sentences. Use the grammar to figure out which ones they are.

For any sentence that is not an actual Malayalam sentence, you should not provide a translation. Write 'Not a Malayalam sentence' instead.

1. ആന സിംഹത്തെ ഓടിച്ചു
2. ആനയെ സിംഹം ഓടിച്ചു
3. ആനയെ സിംഹത്തെ ഓടിച്ചു
4. സിംഹം ഓടിച്ച ആനപ്പുറത്ത് ബാലൻ സഞ്ചരിച്ചു
5. ബാലൻ ഓടിച്ചു ആനപ്പുറത്ത് സിംഹം

YOUR NAME: REGISTRATION #:

(I) Dogs and cats on trees (4/5)

I2 (1 point). Draw the tree for any sentence that uses the V-mod rule. (You may use the English translations in place of the Malayalam words at the bottom of the tree.)

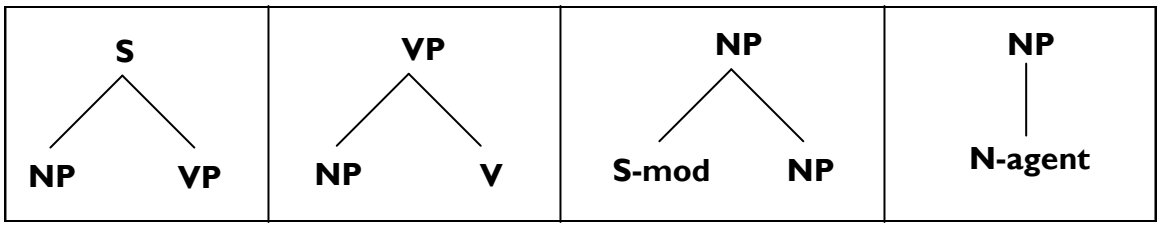
I3 (1 point). Explain what is wrong with the examples that are not actual sentences of Malayalam.

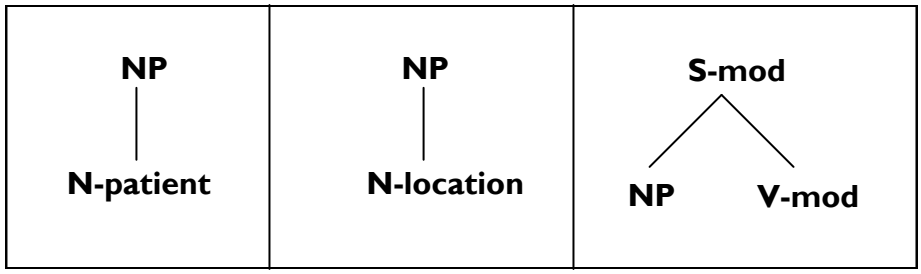
YOUR NAME: REGISTRATION #:

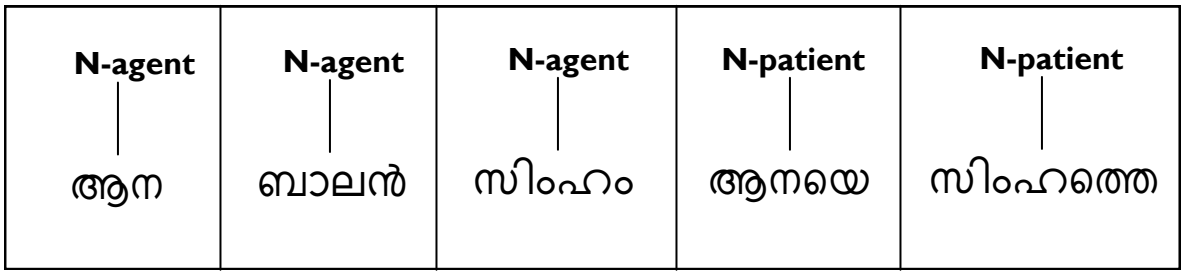
(I) Dogs and cats on trees (5/5)

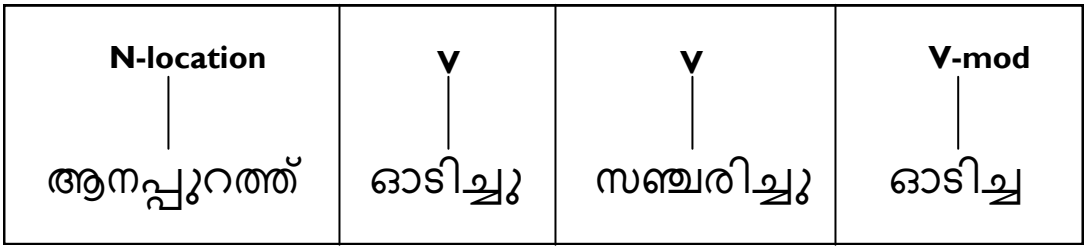
Word translations:

ആന	elephant	ബാലൻ	boy
ആനയെ	elephant	ഓടിച്ചു	chased
ആനപ്പുറത്ത്	elephant's back	ഓടിച്ച	chased
സിംഹം	lion	സഞ്ചരിച്ചു	rode









2010 Solutions

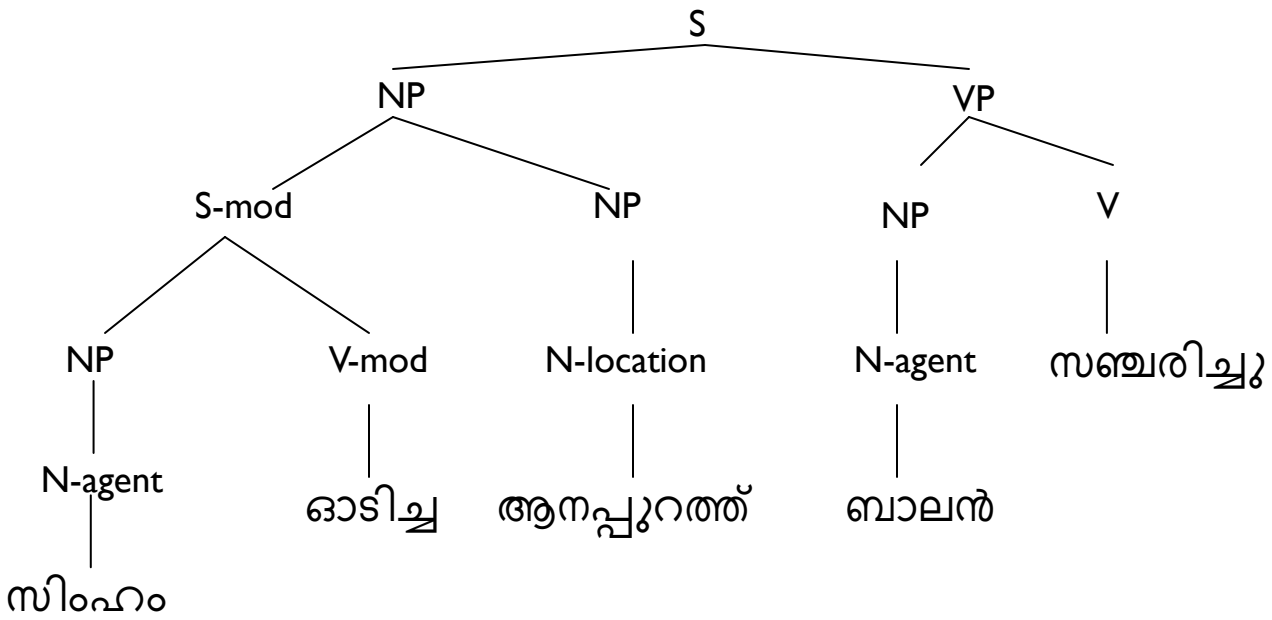
(I) Dogs and cats on trees (1/1)

I1 (3 points).

1. The elephant chased the lion.
2. The lion chased the elephant.
3. [Not a Malayalam sentence]
4. The boy rode on the back of the elephant.
5. [Not a Malayalam sentence]

I2 (1 point). Draw the tree for any sentence that uses the V-mod rule. (You may use the English translations in place of the Malayalam words at the bottom of the tree.)

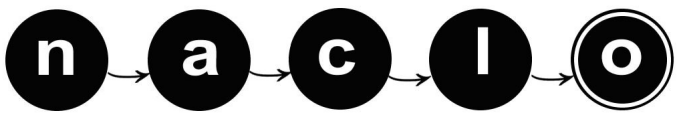
Only sentence 4 uses the V-mod rule.



I3 (1 point). Explain what is wrong with the examples that are not actual sentences of Malayalam.

Sentence 3 is not licensed by this grammar (is not a sentence of Malayalam) because both of the nouns are in the N-patient form, but the grammar rules only allow one of these per (simple) sentence.

Sentence 5 is not licensed by this grammar (is not a sentence of Malayalam) because the first verb is not in the V-mod form. Plain verbs can only come at the end of the sentence, according to our rules.



YOUR NAME: REGISTRATION #:

(15 points)

(L) Real Money (1/2)

Languages often have special systems for counting specific sorts of objects – and money is no exception! Speakers of Cuzco Quechua, a widely-spoken indigenous language of Peru, employed a money-counting system still based on the old colonial Spanish and Peruvian coins the *real* and the *medio* (worth half a *real*).[1] Although Peru hasn't issued a coin based on the *real* in almost 150 years – the current Peruvian currency, the *nuevo sol* (notated *Sl.*), divides not into *reales* but into 100 *céntimos* – the counting system depicted below was still in use in recent times.

L1 (8 points). The following is a conversation between a shopkeeper *(qhatuq)* and a series of customers about the price of various tubers[2]. Knowing that the prices of potatoes, cassavas, and ocas at this market are Sl 0.05, Sl 0.10, and Sl 0.15 each (but not knowing which costs which), fill in the missing questions and answers. We've translated the first question as a guide.

Q: ¿Hayk'apaqmi huh lumu, huh papa, kinsa uqa ima?
("How much for one cassava, one potato, and three ocas?")
A: Pisqaralpaqmi.

Q. ¿Hayk'apaqmi iskay papa, huh lumu ima?
A. Iskaral miyunpaqmi.

Q. ¿Hayk'apaqmi suqta papa?
A. Kinsaralpaqmi.

Q. ¿Hayk'apaqmi iskay lumu, iskay uqa, huh papa ima?
A. Pisqaral miyunpaqmi.

Q. ¿Hayk'apaqmi pisqa uqa, kinsa papa ima?
A. Suqtaral miyunpaqmi.

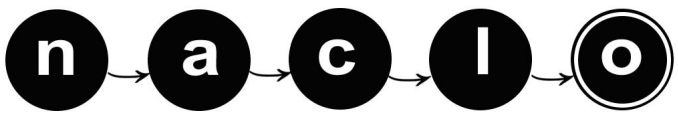
Q. ¿Hayk'apaqmi suqta uqa?
A. _____

Q. ¿Hayk'apaqmi iskay lumu, huh papa ima?
A. _____

Q. _____
A. Miyunpaqmi.

[1]Historical footnote: eight Spanish *reales* made up a *peso de a ocho* or *real de a ocho*. In English these were known as "pieces of eight" or "Spanish doubloons", and in parrot talk as "Awk! Pieces of Eight! Awk!".

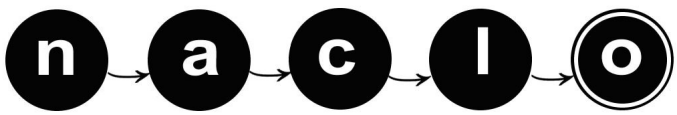
[2] Potatoes were first domesticated in South America, and the Quechua people have cultivated hundreds of species (and thousands of varieties) of potatoes and other tubers.



YOUR NAME: REGISTRATION #:

(L) Real Money (2/2)

L2 (7 points). Explain your answer.



2010 Solutions

(L) Real Money (1/1)

First off, we can divide words into classes: numerals, tubers, monetary amounts, and functional (that is, grammatical) elements. Given that "huh" appears twice, it can't be a tuber, and must in fact be "one". Therefore "kinsa" is 3, and "papa"/"lumu"/"oqa" are the tubers. (They are, in fact, in their correct order in the English translation, although it's not necessary to make this assumption to solve the puzzle.)

"Ima", occuring only when more than one kind of tuber is mentioned, is "and"; in Quechua this occurs after the conjoined elements rather than in between. This leaves "hayk'apaqmi", which must then mean something like "How much is it for..." (and does).

This leaves figuring out the monetary amounts. "-paqmi" in every answer, making it likely that it's the "it's for" meaning in both the questions and answers. Removing the numeral elements, we are left with "-ral" and "miyun". (Recognizing these as Quechua renderings of the "real" and "medio" mentioned in the introduction, although again not necessary to find the solution, would accelerate finding a solution, since a "miyun" is, as noted, half a "-ral".)

The "search space" through which a solver must trek to find reasonable values of "-ral", "miyun", and the remaining numerals can be lessened considerably by noticing that, from the first translated line, the only value that "pisqaral" can have is either 40, 50, or 60 centavos. If the three types of tubers cost 5, 10, and 15, then no matter which costs which a collection of one, one, and three of them must be one of 40, 50, or 60.

From this point, the solver can proceed to test various hypotheses about the values of pisqa- and -ral. Most of these hypotheses will quickly lead to absurdity when considered against the other sentences: "rals" and "miyuns" worth strange fractions of centavos or even negative centavos, numerals denoting complex fractions like 5/3, etc.

Only one consistent system emerges:

A "ral" is worth 10 centavos and a "miyun" is worth 5.
A "papa" (potato) costs 5 centavos, an "uqa" (oca) costs 10, and a "lumu" (cassava) costs 15.
The numbers are "huh" = 1, "iskay" = 2, "kinsa" = 3, "pisqa" = 5, and "soqta" = 6.

The three questions at the bottom are thus:

Q. ¿Hayk'apaqmi suqta uqa? ("How much is it for six ocas?")
A. Suqtaralpaqmi. ("For 60 cents.")

Q. ¿Hayk'apaqmi iskay lumu, huh papa ima? ("How much is it for 2 cassavas and 1 potato?")
A. Kinsaral miyunpaqmi. ("For 35 cents.")

Q. ¿Hayk'apaqmi huh papa? ("How much is it for one potato?")
A. Miyunpaqmi. ("For 5 cents.")