

SOLUTIONS



***The Twelfth
Annual***

**North American
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Linguistics
Olympiad**

2018

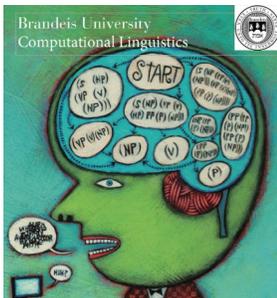
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Invitational

Round

March 8, 2018

Serious language puzzles that are surprisingly fun!

-Will Shortz, Crossword editor of The New York Times and Puzzlemaster for NPR

(I) A Menya Puzzle (1/1)

I1. Match up the Menya words and phrases to their well-formed English translations.

	Menya		English
1.	ai	G.	done
2.	tängga	M.	now (this+TIME)
3.	yä naqänänjä	A.	a very large tree (tree big + very)
4.	ymeqä wänqä	N.	a small child
5.	moni naqänğanji	Q.	Fines are big these days.
6.	ämaqä naqä	B.	an important person (person big)
7.	yämbuayä	E.	a Cassava plant
8.	ymeqä qokä	P.	a son (child + male)
9.	äkwewi ynjä naqä hmanji	D.	The äkwewä is not a large bird.
10.	ainga	F.	long ago (done + TIME)
11.	yä anjä	O.	a wooden house
12.	buayä	K.	a sweet potato
13.	ämaqä qokä	H.	a man (person male)
14.	tä	L.	this
15.	i	J.	that
16.	tä sipqäti botqä äwitäti	I.	I wonder if this is a ship or a boat.
17.	i täqueqä äñi?	C.	That is whose house?

I2.

Translate into Menya.

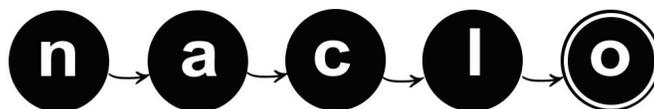
- 'large' *naqä*
- 'a small piece of wood' or 'a small stick' *yä wänqä* (tree/wood small)
- 'the house' *anj* (*anjä+i*)
- 'a very small bird' *ynjä wänqänänjä*

Translate into English.

- anjä naqänänjä* a very large house
- inja* then (that + TIME)
- hiknjänga* (note: *hiknjä* means 'lad' or 'young man') as a youth (while a young man)

I3. Within one of the multiword Menya phrases in the data is a single word typically used by Menya speakers to mean 'husband.' Which word is it?

Answer: *qokä*



(J) It's True: The truth about Chalcatongo Mixtec (1/2)

J1. Answers:

	Chalcatongo Sentences		English Translation
1.	Nduča kaa ñíʔní.	a.	The water is hot.
2.	Maria kúu ñ xasúćí.	e.	Maria is a young person.
3.	Ñíʔní nduča.	f.	The water is hot.
4.	Juan kaa lúlí.	i.	Juan is small / short.
5.	Ndežu kaa žaʔu.	h.	The food is expensive.
6.	Súćí Maria.	g.	Maria is young.
7.	Juan kúu xažiirí.	c.	Juan is my husband.
8.	Pedro kúu xalúlírí.	b.	Pedro is my child.
9.	Kaa kwíí.	d.	It is green.

J2. Translate the following into Chalcatongo Mixtec:

- depth = xakǎnú
- heat = xañíʔní
- Maria is brave = Ndeʔé Maria.
- Pedro** is tall. = Pedro kaa súkú.
- Pedro is a tall person. = Pedro kúu ñ xasúkú.
- The fruit is red. = Kwaʔá xabíśí.
- My fruit is the green one. = Xabíśírí kúu xakwíí.
- * **It** is true. = Kaa ndáa.
- * It is true. = Ndáa.
- * It is the truth. = Kúu xandáa.

*There is no equivalent in Chalcatongo Mixtec of the English "it" in these sentences.

Notes:

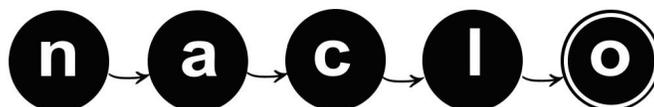
This problem is based on several features of Chalcatong Mixtec – however, for the purposes of the problem, some of the tasks & the discussion below have been simplified.

1. Two copulas:

Chalcatongo Mixtec has two verbs that can be used as copulas: kúu and kaa.

Kúu is used when the predicate is a noun phrase, as in example sentence 2: Maria kúu ñ xasiʔí. = Maria is a woman.

However, when the predicate consists of an adjective, the copula is kaa. This can be seen in example sentence 4: Juan kaa lúlí.= Juan is short / small.



(J) It's True: The truth about Chalcatongo Mixtec (2/2)

2. The copula “kaa” as optional & its role in adding emphasis to the subject as sentence topic:

The copula *kaa* is also optional – as example sentences 1 and 3 demonstrate. Sentence 1 features the copula *kaa*. *Nduča kaa ñíʔní.* – this means that the subject of the sentence, *nduča*, is stressed or emphasised. The speaker is referring to a particular volume of water, whereas in sentence 3, the copula *kaa* can be omitted: *Ñíʔní nduča.* In this case, the speaker is not emphasising a particular volume of water, they are not putting any emphasis on the water as topic & subject of this sentence.

Interestingly, the word order (which is mostly VSO in Chalcatongo Mixtec, but not consistently) changes when the copula *kaa* is omitted, the predicate (adjective) precedes the subject.

3. Nominalization: making nouns out of adjectives

By adding the prefix *xa-* to an existing adjective, you can create a noun with a similar meaning as the original adjective. In example sentence 6: the adjective *súčí* translates as “young”, while in example sentence 2: *Maria kúu ʔ xasúčí.*, a new noun has been formed by adding *xa* to *súčí*, creating the noun “young one (young person)”.

4. Possessive marker –rí:

The suffix *-rí* can be added to the end of a noun to express first person singular possessive (e.g. “my” or “mine”). Example sentence 8 demonstrates this: *Pedro kúu xalúlírí.* Here the original adjective *lúli* (small, short) has become a noun through having the nominalizer *xa-* prefixed (making it mean “child”) and the adding of the suffix *-rí* can be translated as the possessive determiner “my”.

References:

- Macaulay, M. (2002). The syntax of Chalcatongo Mixtec Preverbal and postverbal. In Carnie, A, Harley, H & Dooley, S. A. (Eds), *Verb First. On the syntax of verb initial languages* (pp.). Philadelphia: John Benjamins Publishing Company.
- Macaulay, M. (1993). Argument Status and Constituent Structure in Chalcatongo Mixtec. *Proceedings of the annual meeting of the Berkeley Linguistics Society*, 19(2), 73-85.
- <https://www.ethnologue.com/language/mig>



(K) Sri Lankan Names (1/1)

K1.

Start	End	Type
2	4	Place
9	11	Person
14	16	Person
23	24	Place
26	28	Person
36	39	Place
41	43	Person

This corresponds to:

English	Sinhalese	Type
He lives in the Colombo District.	ඔහු කොළඹ දිස්ත්‍රික්කයේ ජීවත්වේ.	Place
Sometimes, Mrs. Sirisena meets him for meals.	සමහර විට කැමට සිරිසේන මහත්මිය ඔහුව මුණගැසේ.	Person
Mr. Gunaratne eats with them.	ගුණසේන මහතා ඔවුන් සමග ආහාර ගනී.	Person
Last week, he flew to Dehiwala.	ගිය සතියේ දෙහිවලට පැමිණියා.	Place
Mr. Weeraratne always meets him there.	වීරරත්න මහතා නිතරම ඔහුව එහිදී මුණගැසේ.	Person
But, he still lives in Sri Jayawardenepura Kotte.	නමුත් ඔහු තවමත් ශ්‍රී ජයවර්ධනපුර කෝට්ටේ ජීවත්වේ.	Place
Mrs. Weeraratne eats with her cousin when he is away.	වීරරත්න මහත්මිය ඇයගේ දොතියෙක් සමග නිතරම ආහාර ගනී.	Person

Translation credit: S. Suthakaran

For places

- Start with the (ඡ්‍රී) ශ්‍රී and identify Sri Jayawardenepura Kotte (ශ්‍රී ජයවර්ධනපුර කෝට්ටේ) in sentence 6. You know this is a place.
- Using the context of this sentence, find that sentence 1 also has ජීවත්වේ and so this sentence likely has a place. The only place name that could match the place names is that for Colombo District: (කොළඹ දිස්ත්‍රික්කයේ).
- After finding all other solutions (for places and people), you are left with sentence 4. There is only one word that starts with a “d” (දෙහිවලට) in this sentence. This is dehivalata (Dehiwala).

For people

- 2 and 5 share the words ඔහුව මුණගැසේ; while 3 and 7 share the words සමග ආහාර ගනී. Since the language is SOV, you can assume that the words at the end of the sentence are not the names.
- These sentences *all* each have either මහත්මිය or මහතා which are close in form and there are two w/ one version (husband) and two w/ the other (wife). This the most probable choice for the “married” indicator.
- 5 and 7 both have වීරරත්න and නිතරම in them, but since මහත්මිය / මහතා is next to the name and නිතරම shows up in the verb phrase in 7, වීරරත්න මහත්මිය is the probable name in 7, making වීරරත්න මහතා the name in 5, and the other two names following the same pattern (last name + married marker), since it is a rule that the names are one word long last names and no first names.



(L) Peeled Potato Act with Annie (1/1)

L1.

Instance	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Correct Label	V	N	V	N	V	V	V	V	N	N	V	N	N	V	N

L2.

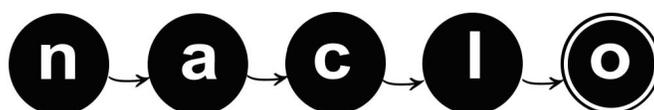
Instance	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Learned Label			V	N	N	V	V		N		V	N	N	V	N

L3. Label all instances V.

This can be used as a baseline, because it requires no linguistic rules of the sentence to assign and is the default *majority* correct V/N option from the correct labels (the “gold standard”).

L4. 1. B; 2. C; 3. A

	Prep	Verb	Noun1	Noun2	Correct	Rule A	Rule B	Rule C	
[1]	as	joined	circus	walker	V				
[2]	of	is	head	acrobats	N				
[3]	in	performs	act	leotard	V			V	
[4]	with	likes	routine	trapeze	N	N			
[5]	as	liked	act	child	V	N		V	2.C cancels A
[6]	with	performs	act	gusto	V			V	
[7]	with	perform	act	sadness	V			V	
[8]	in	lost	penny	street	V				
[9]	with	likes	charm	inscription	N	N			
[10]	with	practiced	routine	Charley	N				
[11]	with	performs	act	clowns	V			V	
[12]	with	likes	act	bananas	N	N	N	V	1.B cancels C
[13]	with	likes	one	pie	N	N	N		
[14]	with	perform	act	Annie	V			V	
[15]	with	do	act	potatoes	N		N	V	1.B cancels C



(M) Quests and Requests in Nivkh (1/2)

M1.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
G	Q	T	K	B	M	P	A	R	N	I	W	D	F	V	S	E	U	H	O	L	C	J

M2.

ñi ʈipikamuxeliɖ	I need your big boat
ñi hæzʏæfk'eliɖ	I need that bear
ñi təfləŋxeliɖ	I need this big ash
ñi p'eʈusk'eliɖ	I need my own meat
ñi ahaqxekiɖ	I need that cap over there

M3.

I need your big track.	ñi ʈpilaʈifk'ekiɖ / xekiɖ
I need my knife.	ñi ñzaqoxekiɖ
I need that cap over there.	ñi ahaqxekiɖ
I need your hare.	ñi ʈəjkxekiɖ
I need my nail.	ñi ñzrovsk'ekiɖ/ xekiɖ

How to solve:

Easy step 1

See that ñi = I

See that xekiɖ = need (x → k' after f and s)

alternate analysis zʏæfk' and liʏsk' end in k' (x → ∅/after k')

These analyses might not pop out at first, but they are seeable.

Easy step 2

Count the nouns in the English translations.

See that fish shows up 3 times.

See that cap shows up 5 times.

See that hut shows up 1 time.

See that all other nouns show up twice.

Step 3a

Look for correspondences in the Nivkh data (looking for fish, cap, and hut)

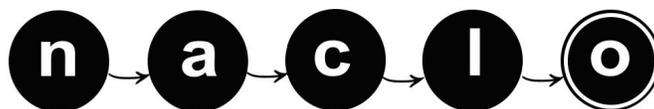
Step 3b

Notice 'pila' (could initially mean 'big' or 'over there' by factoring out all of the nouns – cap is tricky, but the others are easy)

Notice ʈo 3 times (after segmentation of pila), ʈo = fish

Notice ñivra = my hut, so ivra = hut, ñ means my, which is nice because it goes with ñi=I

Notice (h)aq = hut (5 times) – the h will be tricky



(M) Quests and Requests in Nivkh (2/2)

Step 4

figure out if pila is 'big' or 'over there'

compare $\text{t}\pi\text{ilaz}\gamma\text{əfk}'$ and $\text{təpila}\text{tə} = \text{??(that or this)- pila -fish}$

Notice that the two words containing pila have different prefixes (t vs. t)

Look at the other sentences that contain 'big' or 'over there' in their translations.

$\text{z}\gamma\text{əfk}' = \text{either boat or bear}$

Compare I need that boat over there vs I need that fish over there

Notice that the prefixes don't match

Compare I need this big fish with I need your big bear

Notice they have different prefixes, so $\text{tə} = \text{this}$, t =your

Now you can match up 13 with D, 19 with H, 7 with P and 8 with A, ...

Step 5

You still have tə and a-tə – one means a fish and the other means that fish over there

Notice a-mu and $\tilde{\text{n}}\text{-mu}$. $\tilde{\text{n}}\text{mu}$ is my ____ . Of the nouns that appear twice, boat, branch, and picture have 'my' in their translation. Only 'boat' also goes with 'that over there', none have 'a' translations. So mu = boat, $\tilde{\text{n}}$ = my, and a='that over there'.

So 1=G, 16=S, 14=F and 20=O

Step 6 : Cap

aq shows up 5 times (it is haq, and $\text{x} \rightarrow \emptyset$ /after a prefix)

2: $\tilde{\text{n}}\text{i h}\tilde{\text{a}}\text{-haq-xeki}\text{q}$

5: $\tilde{\text{n}}\text{i } \tilde{\text{n}}\text{-aq-xeki}\text{q}$

12: $\tilde{\text{n}}\text{i } \text{t}\text{-aq-xeki}\text{q}$

17: $\tilde{\text{n}}\text{i } \tilde{\text{n}}\text{-it'ulv-haq-xeki}\text{q}$

21 : $\tilde{\text{n}}\text{i haq-xeki}\text{q}$

Meanings :

B : 'I need my cap'

E: 'I need my winter cap'

L; 'I need a cap'

Q: 'I need that cap'

W: 'I need your cap'

evident that 12=W, 5=B, 17=E (so it'ulv(h) = winter, but the 'h' shows up in 21 too, so it'ulv)

a cap vs that cap, we know 'a' = no prefix on fish, and haqxeki q is obviously less prefixed than h $\tilde{\text{a}}$ haqxeki q , so haq = cap (h deletes after a C, or after 'my' and 'your') h $\tilde{\text{a}}$ = that

21=L, 2=Q

Step 7

h $\tilde{\text{a}}$ -zaqo and t -zaqo = that X and your X , so zaqo = knife and 9=R and 18=U

liysk' and t -liysk' = a X and your X, so liysk' = wolf and 10=N and 23=J

t -eflaŋk and $\tilde{\text{n}}$ -eflaŋk = your X and my X, so 22=C and 4=K

$\text{p}'\text{-ez}\eta\text{ai}$ and t -ez ηai = my own X (we haven't seen p' before, but we know t is 'your') and your X, so 6=M and 15=V

i-təfk' and təfk' = his/her X (by elimination) and a X, so 3=T and 11=I

The only thing left was the vowels of the prefixes of a few forms. I took the offenders out. I modified the answers so that there are 2 right answers for 2 of the Eng à Nivkh translations.



(N) You've Got This: Fijian Ownership (1/1)

N1.

	Fijian	English	English phrase	Fijian translation
a.	uto	heart	my heart	na utoqu
b.	yaqona	kava ²	her kava (she's drinking)	na mena yaqona
c.	draunikau	witchcraft	my witchcraft (used on / against me)	na kequ draunikau
d.	dali	rope	your (sing.) rope (you own)	na nomu dali
e.	ika	fish	your (dual) fish (for dinner)	na kemudrau ika
f.	wai	water	your (pl.) water	na memuni wai
g.	luve	child	her child	na luvena
h.	yaqona	kava	his kava (drunk in his honor)	na kena yaqona
i.	waqa	canoe	our (incl.) canoe	na noda waqa
j.	yapolo	apple	their apple (they're selling)	na nodra yapolo
k.	draunikau	witchcraft	your (dual) witchcraft (you're making)	na nomudrau draunikau
l.	dali	rope	your (pl.) rope (restraining you two)	na kemuni dali
m.	maqo	mango	their mango (for drinking)	na medra maqo

N2.
 b. 'My coconut': *na mequ niu* means my coconut for drinking (coconut water from), *na kequ niu* means my coconut for eating (the inside of), and *na noqu niu* means my coconut for selling, picking, etc. There may be up to five meanings available in the data: my inalienable coconut (in a strange fantasy universe), my alienable coconut, my edible coconut, my drinkable coconut (assuming you are referring to the liquid), a coconut that will fall on me or be used against me out of my control.

Notes:

Table of pronouns used in the data set:

	singular	dual	plural
1	-qu		-da (incl)
2	-mu	-mudrau	-muni
3	-na		-dra

(Simplified) System of possessives in Fijian:

- **inalienable / direct possessions:** (most) body parts & relatives (possessor directly marked on the noun, no classifier)
- **indirect possessions:** possessor suffixed on the relational classifier
 - **classifier *me-*:** drinkables / liquids and mushy-soft edibles intended for sucking, slurping or drinking
 - **classifier *ke-*:**
 - * solid edibles intended to eat;
 - * possessor is the subject matter or semantic patient
 - **classifier *no-*:**
 - * general possessions that don't belong in the other three categories;
 - * edibles and drinkables used for other purposes (i.e. selling, growing, etc.)



(O) To Know or Not to Know Literary Tamil (1/1)

01.

a.	He doesn't begin	aarambiyān
b.	We will do	ceyppōm
c.	They didn't know	ariyār
d.	She won't begin	aarambiyāl
e.	We won't do	ceyyōm
f.	You (plural) won't begin	aarambiyīr
g.	He will learn	paṭippān
h.	He didn't learn	paṭiyān
i.	We began	aarambittōm
j.	I didn't do	ceyyēn
k.	We didn't do	ceyyōm
l.	You (singular) don't know	ariyāy
m.	You (singular) knew	arittāy

02.

a.	arittīr	You (pl) knew
b.	aarambippāl	She will begin
c.	ariyōm	We don't/didn't/will not know
d.	paṭippār	They will learn
e.	aarambiyēn	I don't/didn't/will not begin
f.	ceyyīr	You (pl) don't/didn't/will not do
g.	paṭittōm	We learned

Grammar chart:

Person:	Past tense:	Future tense:	Negative*
first sing	stem + tt + ēn	stem + pp + ēn	stem + ēn
second sing	stem + tt + āy	stem + pp + āy	stem + āy
third person sing masculine	stem + tt + ān	stem + pp + ān	stem + ān
third person sing feminine	stem + tt + āl	stem + pp + āl	stem + āl
first plural	stem + tt + ōm	stem + pp + ōm	stem + ōm
second plural	stem + tt + īr	stem + pp + īr	stem + īr
third plural	stem + tt + ār	stem + pp + ār	stem + ār

*when stem ends in -i as in "pati", the -y- is added e.g. "patiyēn" – a glide after a front vowel.



(P) I Know What I Saw (1/1)

1.	Tak rihan
2.	Yaas rihan
3.	Akra tak rihan
4.	Dabalo yaas rihan
5.	Tak akraab rihan
6.	Tak dabaloob rihan
7.	Tak akteen
8.	Rihane tak akteen
9.	Tak rihaneeb akteen

G.	I saw a man
F.	I saw a dog
E.	I saw a strong man
D.	I saw a small dog
A.	I saw a man that is strong
C.	I saw a man that is small
H.	I know a man
B.	I know a man that I saw
B.	I know a man that I saw

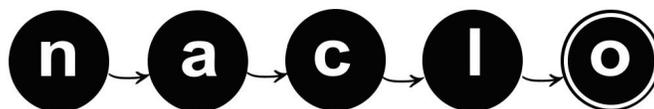
2. (a) *Mek rihan*
 (b) *Kwati tak rihan*
 (c) *Araw kwatiib rihan*
 (d) *Akra mek akteen*
 (e) *Yaas dabaloob akteen*
 (f) *Akteene mek rihan* OR *Mek akteeneeb rihan*
3. (a) I saw a happy donkey
 (b) I know a strong friend OR I know a friend that is strong.
 (c) I saw a dog that I know
 (d) I know a donkey that is small
 (e) In b: *Akraab* should be *Akra* OR change the order of the first two words.

EXPLANATION

The verb (which includes the subject pronoun) occurs at the end of the sentence, after the direct object. The indefinite article ('a') is not translated.

Where nouns are modified, there is a choice of word order: the modifier (an adjective or relative clause) can precede or follow the noun. If it follows, then the final vowel is doubled and a *-b* added (indicating object case). Compare *akra tak* 'strong man' and *tak akraab*, translated here as 'a man that is strong' (actually 'strong man' would also be a reasonable translation, but we have presented the data as if the word-order change mirrored a change in translation, just to make things more straightforward when it comes to possible translations in the exercise). If it is a relative clause, an *-e* is added to the verb, but again the two word-orders are possible, with the same vowel-doubling *+b* rule: from *Tak rihan* 'I saw a man' we get *Rihane tak* or *tak rihaneeb*, both translated as 'a man that I saw' (because in English we can't say something like 'a seen by me man' with the relative clause preceding the noun).

Data from *Invitation to Linguistics* (Richard Hudson, Blackwell, 1984).



(Q) Better Left Unsaid (1/3)

Here is a summary of all the answers--more detailed descriptions follow these answers:

- (a) membuat
- (b) memilih
- (c) mattimbe
- (d) mappande
- (e) hatumba
- (f) hatumbi
- (g) flawta
- (h) ndisko
- (i) ngopak
- (j) esosi
- (k) embafu
- (l) epagi
- (m) etambi
- (n) nasal
- (o) voiceless consonant
- (p) sentence

Part 1:

Every verb has a root. To form the passive of the verb, simply add the prefix *di-*. To form the active, add the prefix *meN-*, where *N* is the nasal at the same place of articulation as the following consonant (or is *n* if the root is vowel-initial). If this prefixing results in a nasal being directly followed by a voiceless stop, delete the voiceless stop; e.g., underlying /mentulis/ becomes /ditulis/.

From *dibuat* and *dipilih*, we can see that the roots for “make” and “choose” are *buat* and *pilih*, respectively. In both cases, the active prefix would then be *mem-* since the start of the root is bilabial; but for *pilih* the *p* must then be deleted because *mempilih* has a nasal followed by a voiceless stop. Thus, the answers are:

- (a) membuat
- (b) memilih

Part 2:

Mandar is very similar to Indonesian but with a couple of differences: First, the default nasal (ie the one before vowels) is *ŋ* rather than *n* as in Indonesian. Secondly, when a configuration of a nasal followed by a voiceless consonant occurs, it is not repaired by deleting the voiceless consonant but rather by turning the nasal into the voiceless consonant; e.g., underlying /mantunu/ becomes /mattunu/. Finally, the active prefix is *maN-* rather than *meN-*.

From *ditimbe* and *dipande*, we can see that the roots for “throw” and “feed” are *timbe* and *pande*. Both of these start with voiceless sounds, so in both cases the nasal turns into a copy of the voiceless sound. Thus, the answers are:



(Q) Better Left Unsaid (2/3)

- (c) mattimbe
- (d) mappande

Part 3:

From the examples, you can see that *-pa* is a possessive prefix while *-pi* means “in”. However, the *p* in these suffixes becomes *b* if the preceding sound is a nasal. Using this info, we get the following answers:

- (e) hatumba
- (f) hatumbi

Part 4:

From the examples, you can see that the prefix *N-* means “my” (where *N* is a nasal at the same place of articulation as the following sound). If the word begins with a voiceless stop, then the *m-* prefixation also results in voicing of the voiceless stop. If it begins with a voiceless fricative, then the *N-* is not realized at all. Using these rules, we get:

- (g) flawta
- (h) ndisko
- (i) ngopak

Part 5:

Each noun has a stem. To make the singular, you give the stem the prefix *o/u-*, while to make it plural you add the prefix *eN-* (where *N* is a nasal at the same place of articulation as the following sound). However, the nasal is deleted from the *eN-* prefix if the following sound is voiceless. Thus, we get the following answers:

- (j) esosi
- (k) embafu
- (l) epagi
- (m) etambi

Part 6:

In all 5 previous parts, the relevant phonological process(es) all worked to avoid having a configuration of a nasal followed by a voiceless stop. Indonesian did this by deleting the stop (which might in fact be better viewed as the nasal and stop coalescing); Mandarin did this by turning the nasal consonant pair into a geminated version of the consonant; Quechua did this by voicing the consonant; Zoque did this by deleting the nasal (if before a voiceless fricative) or by voicing the stop if before a voiceless stop; and Lunyole did this by deleting the nasal. Thus we can sum it up by answering:

- (n) nasal
- (o) voiceless consonant

The word in the bolded sentence that violates the rule is *sentence*, which contains *nt* (as well as [ns] if you think phonetically!):

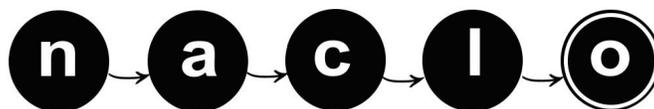
- (p) sentence



(Q) Better Left Unsaid (3/3)

Sources:

- *General inspiration and source for some language data:*
 - ◇ Pater, Joe. "Austronesian nasal substitution and other NC effects." *The prosody-morphology interface* (1999): 310-343.
- *Puyo Pungo Quechua:*
 - ◇ Orr, Carolyn. 1962. Ecuador Quichua Phonology. *Studies in Ecuadorian Indian Languages*, ed. by Benjamin Elson, 60-77. Norman, Oklahoma: Summer Institute in Linguistics.
- *Indonesian:*
 - ◇ The following dictionary: http://www.lexilogos.com/english/indonesian_dictionary.htm
- *Mandar:*
 - ◇ Mills, Roger F. 1975. Proto South Sulawesi and Proto Austronesian Phonology. University of Michigan doctoral dissertation
- *Lunyole:*
 - ◇ The following dictionary: <http://lunyole.webonary.org/>
- *Zoque:*
 - ◇ Padgett, Jaye. "Stricture and nasal place assimilation." *Natural Language & Linguistic Theory* 12.3 (1994): 465-513.



(R) A Make-Shift Code (1/1)

R1.a. UFO

R1.b. USA

Explanation: This sentence has two possible parses--either SSSSRRRSSSSRRRR (UFO) or SSSSRRSSSSRRRRR (USA)--due to prepositional phrase attachment ambiguity.

R2.a. Egypt

R2.b. China

Explanation: This sentence has two possible parses--either SSRSSSSSRSSRRRSSSSRRRRR (CHINA) or SSSRRSSSSSRSSRRRSSSSRRRR (EGYPT)--due to ambiguity in the parts of speech of individual words. The two possible parse could be paraphrased as "The saw (cutting tool) that was made out of glass and that was felt by the really soft orange (fruit) really heard the giraffe" and "The (drinking) glass saw (observed) that the really soft, orange-colored felt (fabric) really heard the giraffe."

R3.a. Quito

R3.b. There are multiple possible reasons why the cities other than Quito wouldn't work; providing any of the answers is fine. Here are the specific problems with the other cities:

- All five of them would require an R before there have been two S's, which is impossible (Fez and Perth start with R, but you cannot reduce without anything on the stack; and Ottawa, Oslo, and Irkutsk start with SR, but you cannot reduce with only one thing on the stack).
- For the sequence of S's and R's to work, the number of S's must be exactly one more than the number of R's. This is not true for any of the five cities.
- Ottawa and Oslo have an even number of letters, which is impossible in this code.
- Fez, Irkutsk, and Perth end with a S, which is impossible.

R3.c. Some possible sentences:

- the giraffe here heard the really really really soft orange glass saw extraordinaire
- the giraffe here heard the really really really glass soft orange spots extraordinaire

