

**The Second Annual
North American
Computational
Linguistics
Olympiad**

**Solutions
for Open Round**

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(A) Of monkeys and children

A1. Translate the following into English:

Ape ratš mī metš.	'The good man works a lot.'
Kukrē ratš kokoi punui.	'The bad monkey eats a lot.'
Ape piņetš mī.	'The man works a long time.'

A2. Translate the following into Apinayé:

Ape piņetš kra ratš.	'The big child works a long time.'
Kukrē ratš kokoi piņetš.	'The old monkey eats a lot.'

A3. Explain the meanings of the following words:

ratš means “large in physical size or quantity”; it is interpreted as “big” when following a word like “monkey” or “child,” and as “a lot” when following the action word.

metš means “good” or “well”; it is interpreted as “good” when following a word like “man,” and as “well” when following the action word.

piņetš means “long time”; it is interpreted as “old” when following a word like “man” or “monkey,” and as “a long time” when following the action word.

(B) Springing up baby

When a word has multiple uses, we distinguish these uses by context. When going from English to Hindi, we can determine the intended meaning of “spring” from the rest of the English sentence. When going from Hindi to English, we look for other parts of the string that the “yesterday” examples have in common with each other, but not with the “tomorrow” examples.

B1. कूद and वसन्त are the translations of “spring.”

B2. वसन्त is the translation of “spring” in the sentence “we always look forward to the spring holidays.”

B3. In the sentence “we always look forward to the spring holidays,” the word “spring” is used in the “season” sense rather than the “jump” sense. In the provided examples, when “spring” is used in the “season” sense, the word वसन्त appears in the Hindi translation. Note that the “jump” sense of “spring” corresponds to a verb in Hindi, and it appears in different tenses, which have different endings in Hindi. Its forms include कूदने, कूद, and कूदकर; the common root is कूद.

B4. The two translations of कल are “yesterday” and “tomorrow.”

B5. “Yesterday” is the translation of कल in the sentence अनामिका यहाँ कल आयी थी।

B6. The word थी from this sentence also appears in both sentences where कल means “yesterday,” and in none of the sentences where कल means “tomorrow.” Since थी resolves कल to “yesterday,” we conclude that it places the described event in the past.

(D) Spare the rod

D1. Translate sentences X1 and X2 into grammatical English using your own words and word order.

X1. Little Red Riding Hood: Grandmother, why do you have such big eyes?
(or “Grandmother, why are your eyes so big?”)

X2. “Grandmother”: To be able to see you better, my child.

D2. Align the sentences in text Y with the sentences in text X by content. Which two sentences in text Y remain unaligned?

X3 – Y1	unaligned – Y5
X4 – Y2	unaligned – Y6
X1 – Y3	X5 – Y7
X2 – Y4	X6 – Y8

If a contestant specified “X5 – Y5, unaligned – Y7,” and the other matches as shown above, he or she also received the full score.



D3. Fill out the leftmost column of the table. If a given word is not translated, use an X.

D4. Fill out the rightmost column of the table.

Language X	Language Y	English
så	så	such
stora	store	large (plural)
öron	ører	ears
du	du	you (subject)
har	har	have
mormor	bestemor	grandmother
X	sa	said
Rödluvan	Rødhette	(Little) Red (Riding) Hood
det	det	they
är	er	are
för att	fordi	for
jag	jeg	I
skall	skal	shall
kunna	kunne	can
höra	høre	hear
dig	deg	you (object)
bättre	bedre	better
X	svarte	answered
X	ulven	the wolf
ögon	øyne	eyes
se	se	see
X	hender	hands
X	klemme	hug
X	stor	large (singular)
X	mun	mouth
äta	ete	eat

The scoring was based on the correct selection of the boldfaced words; the other words did not affect the score. Every boldfaced word was worth 0.5 points; the maximal score was 10, which included 7 for the leftmost column, and 3 for the rightmost column.

D5. Explain your reasoning.

D1: The only reasonable way to solve D1 was to see similarities to the story of the Little Red Riding Hood. We can detect these similarities based on the repetitive structure, impersonation suggested by the quotes around “*mormor*,” and similarity of the word “*Rødhette*” to “Red Hood.” Note that D1 was worth only 1 out of 25 points, which means that the knowledge of the underlying story did not have much impact on the overall score.

D2:

- The text is a dialogue, and each even-numbered sentence answers the preceding odd-numbered sentence in text X. Thus, each even-numbered sentence in text Y should match the preceding odd-numbered sentence.
- Sentence pairs Y1–Y2, Y3–Y4, Y5–Y6, and Y7–Y8 differ only in two words each: *ører/høre*, *øyne/se*, *hender/klemme*, and *mun/ete*. Similarly, pairs X1–X2, X3–X4, and



X5–X6 differ only in *ögon/se*, *öron/höra*, and *tänder/kunna äta upp dig*.

- Since *öror* matches *öron* by regular sound changes, *høre* matches *höra*, *se* matches *se*, and *kunna äta* matches *kunna ete*, the matching sentences are X4–Y2, X1–Y3, X2–Y4, and X6–Y8.
- Since each even-numbered sentence answers the preceding odd-numbered sentence, X3 must match Y1, and X5 must match Y7, leaving Y5 and Y6 unaligned.

A common mistake is to assume that *tänder* matches *hender*, but it is a less plausible sound change, and it does not fit the structure of the story.

D3:

Most pairs of words are related by a small number of regular sound changes, such as *a/e* in *kunna/kunne*, and *ö/ø* and *a/e* in *höra/høre*, so we can match them as follows:

så–så	har–har	skall–skal	bättre–bedre
stora–store	det–det	kunna–kunne	se–se
öron–öror	är–er	höra–høre	äte–ete
du–du	jag–jeg	dig–deg	

This initial matching does not include the words *bestemor*, *Rødhette*, *fordi*, *svarte*, *ulven*, *øyne*, *hender*, *klemme*, *stor*, and *mun*.

- *Rødhette* and *Rødluvan* are the only proper nouns, so we can match them.
- D2 shows that *øyne* matches *ögon*, and that *hender* and *klemme* are unmatched; the scoring did not account for the matching of *mun* (mouth) and *tänder* (teeth).
- *stor* is the singular form of *store*, but the scoring did not account for it.
- “*så Rødhette*” indicates *Rødhette*’s speech in text Y, which serves the same function as “*Rødluvan*” in text X. Therefore, “*svarte ulven*” in text Y indicates speech, just as “*Mormor*” in text X; note that “*svarte ulven*” does not match “*mitt barn*.”
- The commas indicate that *Rødluvan* addresses “*men mormor*,” whereas *Rødhette* addresses “*bestemor*,” which implies that *bestemor* matches *mormor*.
- Finally, *fordi* matches *för att*.

D4: The problem scoring accounted only for *har*, *sa*, *det*, *er*, *jeg*, and *kunne*. We can guess their meaning based on the sound similarity, since the respective English words are related to languages X and Y by regular sound changes, or based on the knowledge of the story, or based on cognates in other Germanic languages. Also, some contestants matched these words based on more distantly related Indo-European languages, such as French.

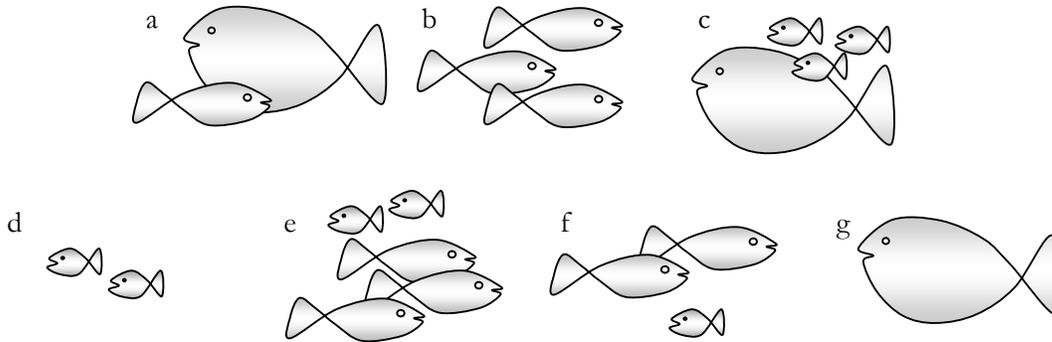
Note that, although the knowledge of the story about the Little Red Riding Hood may help solving this problem, it was essential only for solving D1, which was worth one point. The contestants who focused on the underlying story often gave less linguistic or logical evidence, and they therefore often lost theory points.

D6. What can you say about languages X and Y?

The overlap between the vocabularies of X and Y is much larger than the overlap between them and English. Also, the sound changes between X and Y are smaller than between them and English. Thus, they are more closely related to each other than to English. They are both Germanic languages; specifically, X is Swedish and Y is Norwegian.

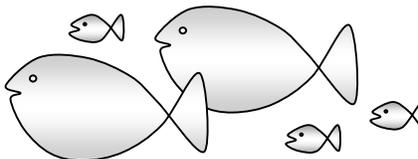
(E) A fish story

E1. Seven fishermen describe their catch; who caught what?



- g 1. "Mä hach'a challwawa challwataxa."
 b 2. "Kimsa hach'a challwawa challwataxa." (**lie**)
 a 3. "Mä challwa mä hach'a challwampiwa challwataxa."
 c 4. "Mä hach'a challwa kimsa challwallampiwa challwataxa."
 d 5. "Paya challwallawa challwataxa."
 f 6. "Mä challwalla paya challwampiwa challwataxa."
 e 7. "Kimsa challwa paya challwallampiwa challwataxa."

E2. Describe this catch.



There are two possible correct answers:

- Kimsa challwalla paya hach'a challwampiwa challwataxa.*
Paya hach'a challwa kimsa challwallampiwa challwataxa.

E3: Describe your reasoning.

We need to notice the following patterns in order to solve this problem:

- *challwataxa* is the last word of each sentence, which may mean "caught" or "fished."
- *mä*, *paya*, and *kimsa* are the numbers.
- *challwa* is the root "fish."
- *-lla* indicates the little fish, whereas *hach'a* indicates the big fish.
- *-mpi* occurs whenever there are two kinds of fish.
- *-wa* occurs at the very end, but before *challwataxa*.