

RESEARCH-SIMULATING LINGUISTIC PROBLEMS

FOR THE CLASSROOM

by

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The class of self-contained linguistic problems, designed by a group of linguistic faculty and graduate students at Moscow State University in the mid-1960's and widely published since then¹, has been also widely used in a variety of graduate and undergraduate courses in linguistics taught in a number of countries in different languages.

The problems simulate and approximate linguistic research and thus not only bridge the gap between the linguistic researcher-instructor and his/her students but also make the students discover phenomena of familiar and unfamiliar languages, invent techniques and methods of investigation, analyze the available data and make the necessary inferences, all by themselves, thus providing them with a kind of first-hand active knowledge which is only rarely available in the linguistic classroom.

The problems are self-contained in the sense that each problem contains all the information which is necessary for its solution and the solver can rely only on his/her competence in the native tongue and ability to observe and reason logically. The problems do not require any previous exposure to linguistics and thus differ dramatically from the usual end-of-chapter exercises.

The author and many of his colleagues have found the problems very useful for illustrating various principles and methods of linguistics and used them both in introductory courses of various levels and courses in phonology, morphology, syntax, semantics, historical linguistics and transformational grammar.

Most of the problems are almost entirely language-independent in the sense that they are equally accessible to native speakers of different languages (provided, of course, that the assignment is adequately translated into the native language of the reader and the data are transliterated if necessary) without any structural changes. This assertion has been confirmed by years of using what was originally formulated in Russian in classes conducted in Hebrew, English, French, and German. The very few language-dependent exceptions among the problems usually require a limited knowledge of a language other than the native language of the reader. Most language-dependent problems deal with a language (or languages) which is (are) supposed to be unknown to the solver,

no matter what his/her native language, and those who happen to know the language are disqualified from solving the problem.

In the next section a few selected problems designed by the group², including, of course, this author, are presented and described, translated, adapted for English and somewhat modified by this author, in terms of their type (T)³, difficulty rating (RD - from 1 to 5), level of linguistic structure (LLS), discovered phenomena (DP), and methodological value (MV).

The solutions, written by this author, are given in Section 2. The style of the solutions is kept as non-technical as possible. They are reasonably complete though a few elementary steps here and there are left to the reader, especially if they are similar to something discussed earlier. The material of those languages which use characters other than Latin are transliterated in ways which are most convenient for the presentation of data and explanation of the solutions.

1. Linguistic Problems

Problem 2. T : Descriptive
RD : 2
LLS: Phonetics
DP : Lack of one-to-one correspondence between sounds and letters
MV : Analysis of data and construction of new material on the basis of discovered regularities

What words will result from reading the sounds of the words below backwards:

note, cheer, lean, dough?

Problem 4. T : Descriptive
RD : 1
LLS: Phonetics
DP : Letters do not coincide with sounds
MV : Search for a certain linguistic phenomenon in the given data

There are three sounds in the word *peach*. How many times does each of these sounds occur in the sentence below?

Psychologically speaking, self-righteousness is not a feeling which lets you reach other people and help them with their problems.

- Problem 7. T : Fact-finding
 RD : 3
 LLS: Phonetics, Spelling
 DP : Letters do not coincide with sounds; some letter combinations are permissible in English while others are not
 MV : Search for linguistic phenomena satisfying certain conditions

In how many ways can you spell the word *wish*? Justify each alternative spelling with one example of an English word in which the necessary sound is denoted by the letter(s) in the proposed spelling.

- Problem 27. T : Descriptive (for Russian speakers)
 RD : 4
 LLS: Morphology
 DP : Languages change; languages contain anachronisms which are incompatible with, or inexplicable in, their modern structure
 MV : Search for an unknown linguistic phenomenon which will support or falsify a hypothesis

One of the Russian words: *dver'*, *peč'*, *ten'*, *lošad'*, *postel'*, *stupen'* changed its gender in the process of history. However, there is a trace of this change in Modern Russian. Find this word and explain.

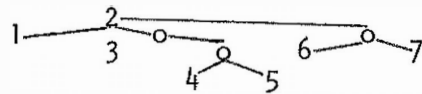
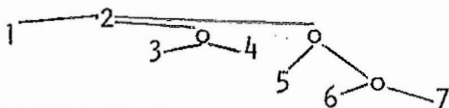
- Problem 36. T : Model application
 RD : 3.5
 LLS: Syntax
 DP : Language can be analysed in terms of applicable formal devices (graphs)
 MV : Application of a formal model to the given data

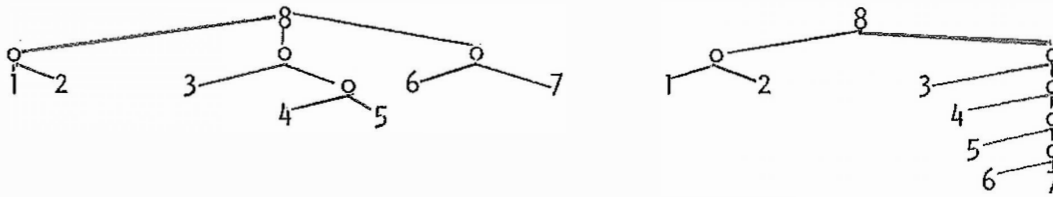
Three sentences are given below followed by four drawings which are called 'graphs' in mathematics. Discover the regularities which relate graphs to sentences and assign the graphs to the sentences so that: (a) each graph corresponds to exactly one sentence, and (b) each sentence has at least one graph corresponding to it. Describe the discovered regularities.

I saw a girl in the garden.

He published this interesting article in France.

A present to my friend from Leningrad disappeared.





Problem 67. T : Cryptogram (for those who are somewhat familiar with both English and Russian)
 RD : 2.5
 LLS: Various
 DP : Unique phenomena in languages
 MV : Discovery of a solution strategy on the basis of unique phenomena (one-letter words, etc.)

The ciphered English words in the left column below are translated into the ciphered Russian words. In English, every letter gets its own Arabic number, with different letters numbered differently. In Russian, quite independently, every letter receives its own Roman numeral, with different letters again numbered differently. There are commas between letters and semicolons between words. English apostrophes are ignored.

1	- I
2,3	- II, III, IV or II, III, I or II, III, V
4,5,6	- V, V
7,8,9	- VI or VII
8,10	- VIII, V, IX
3,10,11	- IX, X or XI, X
7,12	- XII
2,10,12,4,5,6	- II, VII, IX, XIII
13,6,1,5,8,9,14	- XIV, XV, XII, XVI, XIII, I

Now translate the following Russian words and phrases into English:

- 1) XI, III, IX; XIV, XI, V, XV, XIII; XIV, III, II, VII.
- 2) VI, XVI; II, III, XV, I.
- 3) XIV, V, XV, V, XI, XIII, I.
- 4) II, V, VIII, I; XVI, III, XI, XII, IX; IX, III, II.

Problem 70. T : Fact-finding
 RD : 2
 LLS: Syntax
 DP : Seemingly ungrammatical sequences may turn out to be perfectly grammatical in a certain context.
 MV : Discovery and application of the notion of grammaticality

Can each of the seven phrases below occur in a correct (grammatical) English sentence? If it can, give an example of such a sentence - there should be no punctuation between the two words of the phrase.

- 1) could to 2) he have 3) that that 4) the John
 5) he should 6) on walked 7) the did

Problem 73. T : Fact-finding (for those who are somewhat familiar with both English and Russian)
 RD : 3
 LLS: Syntax
 DP : Differences in a free word order may have a semantic value
 MV : Discovery of topic-comment and the influence of word order on it

Below two ciphered English sentences are translated into ciphered Russian sentences. Every English word is ciphered by an Arabic numeral, every Russian word by a Roman numeral. Different words are, of course, ciphered differently, while if the same word recurs in the text it keeps the same cipher. Think of two English sentences which could fit this ciphered text.

1, 2, 3, 4, 5.	-	I, II, III, IV.
6, 2, 3, 4, 5.	-	III, IV, II, I.

Problem 89. T : Monolingua
 RD : 2.5
 LLS: Morphology
 DP : Different languages have different systems of numerals with some similarities
 MV : Discovery that one can understand another language without knowing it at all by virtue of logical analysis; elements of comparative linguistics

Some calculations in Danish are given below. (The words are given as they are used primarily in official documentation and they are spelt approximately as they are pronounced.) Fill in the blanks.

fem X fir = tyve
 fem X fem = femotyve
 fireofirsinstyve + seks = halvfemsinstyve
 seksotresinstyve + niden = femofirsinstyve
 femden + femotresinstyve = firsinstyve
 treden + = niotyve
 seks X ni =
 niotresinstyve + fireotyve =

Problem 92. T : Monolingua
 RD : 2
 LLS: Semantics, Pragmatics
 DP : One can translate from an unknown language

MV : Discovery of the role of international words and familiar situations in understanding language

Translate into English the following article from an Italian newspaper *Paese Sera*:

IL TORNEO DEI TRASPORTATORI STAMPA

Il *Paese Sera* supera il *Corriere dello Sport* 7-0

Nel torneo di calcio dei Trasportatori Stampa organizzato dal Sindacato in collaborazione con l'U.I.S.P. di Roma, la squadra dei trasportatori del *Paese Sera* ha battuto la squadra del *Corriere dello Sport* per ben 7-0. Praticamente la nostra squadra si può già considerare semifinalista.

Le squadre sono scese in campo nelle seguenti formazioni:

Paese Sera: Speca; Iattanzi; Montilla; Pironti; Magagnini; Ramozzi; Iannelli; Porcu; Seghetti I; Seghetti II, Teti.

Corriere dello Sport: Santilli; Ciucci; Elmi; Pighi; Di Maggio I; Carciolli; Collalunga; Di Maggio II; Di Maggio III; Del Pelo; Giovannola.

Le reti sono realizzate da Porcu al 17' ed al 30' del primo tempo; da Seghetti I al 15', 19', 23' ed al 31', autogol del *Corriere dello Sport* al 34'. Ottimo l'arbitraggio del Sig. Tranquilli di Roma.

Note: You may use the following clues:

- 1) il torneo dei trasportatori stampa - the tournament of newspaper boys
- 2) *Paese Sera* and *Corriere dello Sport* are the names of two Italian newspapers and need not be translated
- 3) calcio - soccer.

Problem 93. T : Comparative
RD : 2.5
LLS: Phonetics
DP : Regular phonetic correspondences between languages are the results of language changes
MV : Discovery of the ordering and interaction of subsequent language changes

The Portuguese language is a descendant of Latin. The bulk of its words, the so-called 'originally Portuguese' words, are therefore results of gradual historical changes of the corresponding Latin words. Besides that, at various stages of its development Portuguese borrowed other words from various languages. In the left column below you will find a few words of modern Portuguese; in each line of the right column there is a word in Latin or some other language from which the corresponding Portuguese word is derived. The Portuguese words in the left column can be divided into three groups: originally Portuguese, early borrowings, late borrowings. Assign each Portuguese word to one of these groups.

chegar	-	plicare
praino	-	plaine
plátano	-	platanum
chão	-	planum
plebe	-	plebem
cheio	-	plenum
prancha	-	planche

Note: In Portuguese *ch* is pronounced as *sh*.

Problem 96. T : Monolingua
 RD : 3
 LLS: Semantics, Pragmatics
 DP : One can translate from an unknown language
 MV : Discovery of the role of international words,
 familiar situations and recognizable elements
 of universal grammar in understanding language.

Translate the dialogue below from Modern Greek into English:

'Kserete afton ton anthropon?'
 'Ne, ksero.'
 'Pyos ine aftos o anthropos?'
 'Aftos o anthropos ine o Ellinas apo tin Kipron. To onoma aftu
 tu anthropu ine Andreas.'
 'Mila Ellinika?'
 'Fisika, mila Ellinika poli kala. Ke mila Rusika.'
 'Ke sis, milate Rusika kala?'
 'Ohi, ego den milo Rusika. Ksero mono merikus leksis ke frasis.
 'Milo ke grafo Anglika kala. Ke sis, kserete Anglika?'
 'Ne, ksero afti ti glossa.'
 'Afto ine kala.'

Problem 107. T : Bilingua
 RD : 2.5
 LLS: Syntax
 DP : One can translate from and into an unknown
 language; the same words in different order
 may form different sentences.
 MV : Discovery of the semantic value of word order
 in an unknown language and of the notion of
 the syntactic constituent

Three Tajiki sentences are translated below into English. Every phrase consists of four words. Translate each Tajiki word into English.

dūsti xubi xamsoyai shumo - good friend of your neighbor
 xamsoyai dūsti xubi shumo - neighbor of your good friend
 xamsoyai xubi dūsti shumo - good neighbor of your friend

Problem 113. T : Bilingua with mixed translations ("Kibuzi")
 RD : 4.5
 LLS: Morphology, Syntax
 DP : One can translate from and into an unknown language; grammars tend to be regular
 MV : Discovery that one can detect and correct mistakes in an unknown language on the basis of its own regularities; role of frequency in linguistic analysis

Sixteen Hungarian sentences are listed below. Three of them are incorrect (ungrammatical).

Az asztalt látom.	A libát látom.
Az asztal ott van.	A sör itt van.
Az asztalt hozom.	A sört itt van.
A húst látom.	A sört hozom.
A hús itt van.	Az eke itt van.
A húst eszem.	A hús hozom.
A hús ott van.	Az hús itt van.
A húst hozom.	A rádiót látom.

Out of the sixteen English sentences below only thirteen are the correct translations of the thirteen grammatical Hungarian sentences - the other three English sentences do not correspond to any Hungarian sentence.

I see the meat.	I eat the meat
I see the goose.	I bring the table.
I see the table.	I bring the meat.
The meat is here.	I bring the beer.
The beer is here.	I see the radio.
The meat is there.	I eat the goose.
The plough is here.	The goose is here.
The table is there.	The goose is there.

Discover the ungrammatical Hungarian sentences. Relate the grammatical Hungarian sentences to their correct English translations.

Problem 122. T : Kibuzi
 RD : 3.5
 LLS: Morphology
 DP : Different combinations of English nouns with prepositions may correspond to different forms of one word in a different language.
 MV : Discovery of the notion of case; role of frequency

The Estonian words below are translated into English but the translations are listed in the wrong order and do not correspond to the Estonian words after which they occur.

laua1	-	of the cake	toolita	-	from the chair
piruka	-	on the cake	toolilt	-	without the chair
tehas	-	on the table	lauata	-	from the school
lauas	-	in the factory	pirukalt	-	without the table
teel	-	in the table	tehas	-	from the table
pirukas	-	on the road	laualt	-	from the cake
koõlis	-	in the cake	koolilt	-	of the factory
piruka1	-	in the school			

Translate the Estonian words correctly by reordering the given English translations. Indicate how many different forms (cases) of Estonian words are represented in the data and what each of them means.

- Problem 125. T : Bilingua
 RD : 2
 LLS: Morphology, Semantics
 DP : Certain meanings which are expressed by different words in English can be expressed by only slightly different forms of the same word in Arabic.
 MV : Discovery of causality as a morphological/semantical category

A few words of Classical Arabic are translated below into English:

bala'ya	-	he arrived, achieved
balla'ya	-	he delivered
'arafa	-	he learnt, found out
'arrafa	-	he notified, told
lahā	-	he amused himself
lahhā	-	he amused (somebody else)
rakada	-	he went to bed
raḳḳada	-	he put (somebody) to bed

Translate into English the Arabic words ḡakkara and naḡā if it is given that naḡḡā means 'he saved' and ḡakara 'he recalled'.

- Problem 130. T : Kibuzi
 RD : 4.5
 LLS: Morphology, Semantics
 DP : The plural and diminutive are expressed in Arabic by different forms of the same word
 MV : Discovery of an entirely different morphological structure with the consonants and vowels of a word playing different roles

Each of the eight Arabic nouns below corresponds to one of the English words or phrases in the next line. However, the order of translations does not correspond to that of the originals.

'ashbāl, bunayy, kinn, 'aknān, shubayl, nibr, 'arfād, nubayr

nests, small warehouse, lion cubs, little lion cub, sonny (little son), nest, warehouse, gifts

Translate the Arabic word *fulaym* into English.

Problem 139. T : Kibuzi
RD : 2
LLS: Morphology, Semantics
DP : Parts of Swahili words can correspond to separate English words
MV : Discovery of elements of agglutinative morphology; elements of semantic analysis

The six Swahili words below are translated into English in the wrong order:

mtu, mbuzi, jito, mgeni, jitu, kibuzi

giant, small goat, guest, goat, man, big river

Rearrange the translations correctly.

Problem 140. T : Kibuzi
RD : 3
LLS: Morphology, Semantics
DP : Parts of Swahili words and the meanings they express may not correspond to parts of English words or phrases
MV : Discovery of elements of agglutinative morphology; elements of semantic analysis

The nine Swahili words below are translated into English in the wrong order. Rearrange the translations correctly.

pukuta, kutazama, pukutisha, panda, tazamisha, kupukuta, kuamka, kupanda, tunisha

to crumble, to climb up, a climb, to shake off, a fall, to infuriate, a look, an awakening, to attract attention

Problem 142. T : Descriptive
RD : 3
LLS: Morphology

- DP : Japanese words can consist of the same elements in a different order and mean two different things
 MV : Discovery of complementary distribution

All of the five Japanese words below mean different things. Each of the words consists of two meaningful elements. Altogether, there are three such meaningful elements in all the words. One of these elements can be expressed by two different sequences of sounds; each of the other two meaningful elements is always expressed by the same sequence of sounds.

weki, kigi, tzugiki, kiwe, kitzugi

Discover the two sequences of sounds which express the same meaningful element. Can it be done in a unique way?

- Problem 151. T : Bilingua
 RD : 2.5
 LLS: Morphology
 DP : Different languages have different systems of numerals with certain similarities
 MV : Discovery that one can understand another language without knowing it at all by virtue of logical analysis

A fragment from the Japanese multiplication table is given below. Fill in the blanks.

futatzu	X	yotzu	=	yatzu
itzutzu	X	itzutzu	=	nidzyugo
yatzu	X	kokonotzu	=	sitidzyuni
itzutzu	X	yatzu	=	yondzyu
mitzu	X	mutzu	=	dzyuhati
kokonotzu	X	mitzu	=	nidzyusiti
kokonotzu	X	mutzu	=	
kokonotzu	X		=	hatidzyuiti
yotzu	X		=	sandzyuni

- Problem 153. T : Monolingua - Bilingua
 RD : 2
 LLS: Phonology
 DP : While borrowing words from a foreign language Japanese substitutes its own sounds for the original ones in a regular way
 MV : Discovery of phonological naturalization

There are many words and phrases in Japanese which have been borrowed from English. A few of them are listed below:

redzonansu, oputimisuto, pen, endzin, medo in dzyapan, yankee, noto-bukku, supu, nyuyoky-timudzu, sekusyon, mota, dokuta, dzigudzagu, tikketto, indakusyon, syokku, syoppu, burokku, baransu, uisukee, miru, oiru, surogan, riburaree, eebuningy, bandaridzumu, intabyu, pasento, massadzi, ba, suta, atorakusyon, oba-koto, supido, dzyanaridzumu.

What can these words mean and what are the original English words? How will the following words be pronounced in Japanese:

elevator, seal, yard, bolt, cook, trust, crane, knob, victor clerk, lucky, color, supper, error.

2. Solutions

Problem 2. Every word consists of a sequence of sounds which do not necessarily correspond to the English letters. Thus *cheer* consists of three sounds: the first sound of the word *chew*, the first sound of *it* and the first sound of *red*. Read backwards these sounds make up the word *rich*. The other words yield the following OPPOSITES: *note - tone*; *lean - Neil*; *dough - ode*.

Problem 4. The word *peach* consists of three sounds: the first sound of *pen*, the first sound of *easy* and the first sound of *chew*. They occur in the given sentence 5, 5 and 3 times, respectively.

Problem 7. Actually, the only plausible alternative spelling is perhaps *whish*, and some people would pronounce this word slightly differently. However, if we think of all the possible ways to spell each of the three sounds of the word, we will come up with such 'wild' spellings as *ou* for *w* (as in *Ouija*), *o* for *i* (as in *women*) or *ti* for *sh* and combine them in various ways.

Problem 27. If we think of different forms of the given words and words related to them, we soon discover that, while all the six words are feminine, *ten*¹ is the only one whose diminutive *tenek* is masculine. In other words, this word is the only one which shows a trace of a different gender and it is reasonable to conclude that the initial, non-diminutive form also used to be masculine.

Problem 36. First we notice that there are four graphs but only three sentences. Since each sentence should have a graph corresponding to it this can only mean that one sentence has two graphs corresponding to it. This implies that this sentence should be different from the others in that it is sort of 'double' while they are single. Obviously

we do not know yet what it is the graphs will reflect; however, if we look at the sentences closely we will notice that the first two consist of seven words and the last sentence of 8 words. At the same time two graphs have digits from 1 to 7 and two from 1 to 8. If we assume that the digits in the graphs correspond to words then it will follow that the last two graphs (with 8 digits) both correspond to the last sentence. What makes it different from the others, sort of 'double', while the other two are 'single'? The last sentence can be understood in two different ways: as a *present from Leningrad* or *my friend from Leningrad*. It is reasonable to assume then that the graphs reflect the way(s) words are combined in a sentence. The first two graphs have 2 at the top, and in both sentences they correspond to, the second word is the verb. In the last two graphs 8 is the top digit and the verb is indeed the last (eighth) word of the last sentence. Comparing the ways the digits are linked in the graphs we can easily establish now that the first graph corresponds to the first sentence, the second to the second and the third and fourth to the third sentence, with the third graph reflecting the *present from Leningrad* interpretation and the fourth the *friend from Leningrad* one.

Problem 67. The only English one-letter word which can be translated as a Russian one-letter word is *I* (1=i; 1=И). The only Russian two-letter word which consists of two identical letters is *ee* (4=h, 5=e, 6=r; V=e). The only English three-letter word which can be translated as either of two Russian two-letter words is *and* (7=a, 8=n, 9=d; VI=a or И, VII=И or a). The last English word: 13,r,i,e,n,d,14 translated as XIV, XV, XII, XVI, XIII, Я, must be *friends* (13=f, 14=s; XII=y, XIII=Б, XIV=Д, XV=p, XVI=В). The word a,12 translated as *y* is then *at* (12=t). 2,10,t,h,e,r, translated as II, И or a, IX, Б, is *mother* (2=m, 10=t; II=М, VII=a (then VI=И), IX=И). М, III, IV; М, III, Я; and М, III, e are all translations of one English word m,3 which must then be *my* (3=y; III=о, IV=И). Finally, 8,10 is *no* and 3,10,11 - *you* (11=u; VIII=Н, X=И, XI=В). The Russian words and phrases to translate are, therefore as follows:

- | | | |
|----|----------------|---------------------------------|
| 1) | Вот дверь дома | - This is the door of the house |
| 2) | из моря | - from the sea |
| 3) | деревья | - trees |
| 4) | Меня зовут Том | - My name is Tom |

Problem 70. The answer is 'yes' for the first six phrases and 'no' for the last one. The examples are as follows:

- 1) He did all he could to help them.
- 2) Does he have a sister?
- 3) I saw that that plan was not working.
- 4) I mean the John who was at the party.
- 5) He should do it tomorrow.
- 6) Suddenly the boxer he bet on walked away.

Since no example can be found for the last phrase (except when *the* is in quotation marks or inverted commas, e.g. *The last 'the' did not appear in the text at all*), it is reasonable to assume that the phrase cannot occur in a grammatical English sentence.

Problem 73. We notice that the two English sentences differ in just one word, the first one. The Russian sentences consist of exactly the same words but in a different order. There are only four words in the Russian translations while the English sentences consist of five words. If we assume that the 'extra' word in English is the article, which has no counterpart in Russian, then it will be easy to see that the difference in definiteness/indefiniteness, which is expressed by *the/a* in English, should indeed be expressed by different word orders in Russian. The supporting examples may be as follows:

The man came to town	- Человек пришел в город
A man came to town	- В город пришел человек

Problem 89. There are three kinds of Danish numerals in the data. Let us call them PRIMITIVE (*fem, fir, seks, ni*), COMPOUND (*niden, femden, treden*) and COMPLEX (all the others). The compound numerals seem to consist of a primitive numeral and *den*, e.g. *femden*. Some complex numerals consist of five components: a primitive numeral, *o*, another primitive numeral, *sins* and *tyve*. Other complex numerals lack the first two components from that list but have the other three; still others lack the third and fourth component but have the other three. One complex numeral, *halffemsinstyve*, has a unique structure. As a rough working hypothesis we can assume that the three kinds of numerals may correspond in English to the three kinds exemplified by *five, fifteen, and fifty-five*, respectively. The shorter complexes may then correspond to round numbers, e.g. *fifty*, or teens, e.g. *fifteen*. The first clue is given in the second line: there are only two primitive numbers which are repeated in their own square degree - $5 \times 5 = 25$ and $6 \times 6 = 36$. Accordingly, there are two possibilities: either $fem=5$, $tyve=20$ and then *fir* in the first line is 4 or the same values are 6, 30 and 5, respectively. The sum in the fifth line, however, must be a round number, and the only way the numbers mentioned there can be combined to produce the round sum is for *fem* to be 5. That sum is a combination of *fir* and *tyve*. If $fir=4$ and $tyve=20$ then the line can be interpreted as $(5 + 10) + (5 + tre \times 20) = (4 \times 20)$. Neither the second possibility mentioned above (with $fem=6$) nor any other interpretation of *o* and *sins* is compatible with the calculation in the fifth line. It follows then that $tre=3$, which is, of course, indirectly supported by the similarity of this word with *three* (incidentally, *fir* will remind those who are a little familiar with German of *vier=4* and also perhaps *fem* of *fünf=5* and *seks* of *sechs=6*). It also follows then that $den=10$ and is similar to *teen*. If *seks* is indeed 6 then the fourth line can be immediately interpreted as $(6 + 3 \times 20) + (ni + 10) = (5 + 4 \times 20)$, and $ni=9$. The third line is then $(4 + 4 \times 20) + 6 = halv \ ? \ 5 \times 20$. We know that the sum is, in fact, 90. The mysterious

halv reduces $5 \times 20 = 100$ to 'half way' between 100 and 80, which is, of course, 4×20 (*halv* would naturally remind us of *half*). It is easy now to fill in the blanks: *seksden*, *femden* and *treohalvfemsinstyve*. It is interesting to note that in compound numerals greater than 20, in Danish *tyve*=20 plays the role of the English *ty*=10.

Problem 92. Besides the given clues there are two more in the data: our knowledge of the described situation (a soccer game) and the 'international words', i.e., words which travel from language to language and mean the same thing. We cannot elaborate on the knowledge of the situation here but it is much harder to translate the text without it, which is true of all translation. The helpful international words are *supera*, *organizzato*, *Sindacato*, *collaborazione*, *Roma*, *squadra*, *praticamente*, *campo*, *seguenti*, *formazioni*, *realizzati*, *primo*, *tempo*, *autogol*, *ottimo*, *arbitraggio*. While some elements of the text can be translated quite accurately on the basis of these clues, other parts of the text need some guessing work though it is virtually impossible to go too far off target.

"THE TOURNAMENT OF NEWSPAPER DELIVERY BOYS.

The *Paese Sera* beats the *Corriere dello Sport* 7:0

In the tournament of newspaper delivery boys organized by the Syndicate in collaboration with U.I.S.P. of Rome, the team of the delivery boys of the *Paese Sera* has beaten the team of the *Corriere dello Sport* by 7:0. Practically, our team may already consider itself a semifinalist.

The teams came out to the field in the following formations:

The *Paese Sera*: (11 names)

The *Corriere dello Sport*: (11 names)

The goals have been realized by Porcu in the 17th and 30th minutes of the first half; by Seghetti I in the 15th, 19th, 23rd and 31st minutes /of the second half/, the self-goal of the *Corriere dello Sport* in the 34th minute. The arbitration (umpiring) of Mr. Tranquilli of Rome /was/ optimal (excellent)."

Problem 93. It is easy to divide the Portuguese words into 3 groups: there are words with *ch* at the beginning, words with *pr* and words with *pl*:

chegar
chão
cheio

praino
prancha

plátano
plebe

All the foreign words from which these words are derived have *pl* at the beginning. It is obvious, therefore, that the *ch* and *pr* words underwent a change in the course of history. It is reasonable to assume that if there is a rule in a language requiring a change of a certain kind, e.g., for the initial *pl* to change into *ch* or *pr*, it will affect all the *pl* words in the language without exception. On the other hand, such a change may be temporary, and some time later - a few centuries perhaps - it may be no longer valid. In view of that the words *plátano* and *plebe*

can be only late borrowings which entered the language after the *pl→ch* and *pl→pr* changes were no longer valid. In principle, these two changes may have occurred in any order but the former is more likely to have occurred first because the involved change is more significant, and the longer a word remains in the language the more changes it is susceptible to. It follows then that the leftmost column above is originally Portuguese, the central column contains early borrowings, and the right column late borrowings.

Problem 96. The problem is solved with the help of the same clues as Problem 92, namely the international words and the knowledge of the situation. However, unlike in that problem, the situation is not given to us in advance and should, in fact, be guessed thanks to the international words. These include *anthropon* (-os, -u), *Ellinas*, *Kipron* (?), *onoma*, *Andreas*, *fisika*, *Ellinika*, *poli*, *Rusika*, *mono*, *ego*, *leksis*, *frasis*, *grafo*, *Anglika*, *glossa* (?). We can guess that the dialogue is basically about languages. Also, there are two valuable grammatical clues. If we compare the question-answer pairs with the exception of the second one, they all comprise the same or similar words: *kserete*: *ksero*, *mila:mila*, *milate:milo*. It is relatively easy to guess that when the word does not change from question to answer, the dialogue is about a third person. When it does change, the only reason for that must be the switch from 'Do you ___?' to 'Yes, I ___' or 'No, I do not ___', in English translation. It follows from here that the extra word *den* in the fourth answer corresponds to 'not' or rather 'do not' in English and *ohi* and *ne* mean 'no' and 'yes' respectively. The text can be translated as follows:

'Do you know that man?'
 'Yes, I do (know).'
 'Where from is that man?'
 'That man is a Greek from Cyprus. The name of the man is Andreas.'
 'Does he speak Greek?'
 'Naturally, he speaks Greek very well. He also speaks Russian.'
 'And you, do you speak Russian well?'
 'No, I do not speak Russian. I know only several words and phrases.
 I speak and write English well. And you, do you know English?'
 'Yes, I know that language.'
 'That is good.'

Problem 107. It is reasonable to suppose that the structure of the Tajiki phrases somehow reflects that of the English translations. The translations are possessive phrases which consist of two parts, the POSSESSOR and the POSSESSED, and 'of'. Besides 'of', each translation consists of the same four words: 'friend', 'good', 'neighbor', 'your'. Each Tajiki phrase also consists of the same four words: *dūsti*, *shumo*, *ṡamsoyai*, *xubi*. It is obvious that one English word has no equivalent in the Tajiki phrases, and it is easy to guess that the best candidate for the omitted word is 'of', since, for instance, it can be dispensed with

in the English possessive constructions as well, e.g., 'your neighbor's good friend'. It is clear that the words in the Tajiki phrases do not occur in the same order as in the English translations - every Tajiki phrase ends in *shumo*. This fact should correspond to some property shared by all the translations. The only property they all share is having 'your' in the possessor. The second and third Tajiki phrases begin with *xamsoyai*. The only property their translations share is having 'neighbor' in the possessed. Similarly, comparing the first and third phrases and their translations we can relate *xubi* to 'good'. The solution, therefore, is as follows: *dūsti* 'friend', *shumo* 'your', *xamsoyai* 'neighbor', *xubi* 'good'. We also notice that while words like 'your' and 'good' precede the words they refer to in English, in Tajiki their equivalents follow the words they refer to.

Problem 113. There are two types of Hungarian sentences in the data: the three-word sentences and the four-word sentences. It is easy to see that both types consist of two parts - the first two words which occur in both and then either one word (*látom*, *hozom* or *eszem*) or two words (*ott van* or *itt van*). We can also notice that in most cases the second word has an extra -t if it is followed by one word. There are two sentences which violate this regularity: *A sort itt van* and *A hús hozom*. These are candidates for ungrammatical sentences. The third candidate must be *Az hus itt van* because in all the other sentences with *hus/hust* these words are preceded by *a* rather than by *az*. We can now notice that *az* is used only with words which begin with a vowel. If we now compare the Hungarian sentences with their English translations we will notice that the latter are also of two types: 'I ___ the ___' and 'The ___ is here/there'. The international word 'radio' gives us an easy clue: *A rádiót látom* must be 'I see the radio', and, therefore, the three-word Hungarian sentences correspond to the first English type above and the four-word sentences to the second. *A/az* is obviously 'the', and the first two words of the Hungarian sentences always correspond to the English 'the ___'. Ignoring *a/az*, let us present the Hungarian data in a table:

	<i>látom</i> -4	<i>hozom</i> -3	<i>eszem</i> -1	<i>ott van</i> -2	<i>itt van</i> -3
<i>asztal</i> (t)-3	+	+		+	
<i>hús</i> (t)-5	+	+	+	+	+
<i>liba</i> (t)-1	+				
<i>sör</i> (t)-2		+			+
<i>eke</i> (t)-1					+
<i>rádió</i> (t)-1	+				

The pluses correspond, naturally, to the combinations represented in the data. In order to solve the problem we must obviously come with an English table which will match the table above, with the words and phrases in the lines and columns being the translations of the Hungarian words and phrases. At this stage we know only that the last line of such an English table contains 'radio' and the first column 'see'. It is time now

to look at the frequency list, i.e. how many times each word occurs in the data. This is exactly what the hyphenated figures in the table stand for. The most frequent Hungarian word is *hús(t)* and it must be translated as 'meat' since this is the only English word which occurs 5 times (which also means that all the sentences with 'meat' are legitimate translations). One English sentence of the first type and two of the second are not legitimate translations. In the first type it is 'I eat the goose' - since *hozom* must be 'bring' (no other English verb occurs 3 times), *eszem* is 'eat', and *eszem* occurs only once with *húst* 'meat'. Now, there is one Hungarian noun, *asztal(t)*, which occurs 3 times and two English nouns, 'table' and 'goose' with the same frequency. Obviously, one of the English frequencies is false and involves illegitimate translations. *Asztal(t)* occurs with 'see', 'bring' and 'is there', which corresponds to 'table', not to 'goose'. A few things follow from this immediately: first, *ott van* is 'is there' and, accordingly, *itt van* is 'is here'; secondly, the two last English sentences are illegitimate. Now it is very easy to work out the few remaining details and to obtain the following matching table for the English translations:

	'see'-4	'bring'-3	'eat'-1	'is there'-2	'is here'-3
'table'-3	+	+		+	
'meat'-5	+	+	+	+	+
'goose'-1	+				
'beer'-2		+			+
'plough'-1					+
'radio'-1	+				

Problem 122. Also a "kibuzi", this problem is easier than the previous one because there are no incorrect data involved. The Estonian table which should be matched by an English one is as follows:

	#-2	-1-3	-s-4	-ta-2	-1t-4
laua-4		+	+	+	+
piruka-4	+	+	+		+
tehas-2	+		+		
tee-1		+			
kooli-2			+		+
tooli-2				+	+

There are two alternative solutions of the problem which depend on whether *laua* and *piruka* are identified as 'table' and 'cake', respectively, or vice versa, since both of the English words occur 4 times each. The correct decision coincides with the former variant and can be reached only by those who can relate *kooli* to 'school' or the forms this word takes in other languages (French 'école', Russian 'shkola', etc.), or *piruka* to the Russian 'pirog' (cake), or *tooli* to the Russian 'stul' (chair). Comparing the forms which various Estonian words have with their translations and also noticing that *tee*, which occurs only once, must be 'road' and -1 'on', we come up with the following matching table for the correct solution:

	'of'-2	'on'-3	'in'-4	'without'-2	'from'-4
'table'-4		+	+	+	+
'cake'-4	+	+	+		+
'factory'-2	+		+		
'road'-1		+			
'school'-2			+		+
'chair'-2				+	+

Problem 125. We notice that the second consonant of the Arabic words doubles when the action is directed not at the agent himself but rather at somebody or something else. *ḥakkara* then must mean 'he reminded (made somebody remember)' and *naḡa* 'he escaped (saved himself)'.

Problem 130. Another "kibuzi", the problem yields the following table for the Arabic data:

	'a--ā -3	u--ay -3	-i- -2
sh--b--l -2	+	+	
b--n--y -1		+	
k--n--n -2	+		+
n--b--r -2		+	+
r--f--d -1	+		

We must now discover two similar groupings in the English data which will correspond to the lines and columns of the Arabic table, respectively. The analysis of the English meanings suggests that the former group includes the IDEAS: 'nest', 'warehouse', 'lion cub', 'son', 'gift', while the latter includes the grammatical forms of the words: Singular, Plural and Diminutive. The next step is to look at those Arabic words which occur only once. There are two, *b--n--y* and *r--f--d*, and they may each correspond to either 'son' or 'gift'. Just as in Problem 122, we are dealing here with two alternative solutions, only one of which, of course is actually correct in Arabic. The correct solution is available to those who will realize, from Arabic fairy-tales or well-known names (or, for that matter, from Hebrew names since Hebrew is a very similar Semitic language), that *ibn* in Arabic (*ben* in Hebrew) means 'son of', and therefore, *b--n--y* must mean 'son'. The grammatical forms and the rest of the matching table follow then immediately:

	Plural-3	Diminutive-3	Singular-2
'lion cub'-2	+	+	
'son'-1		+	
'nest'-2	+		+
'warehouse'-2		+	+
'gift'-1	+		

The word *fulaym* must then mean 'small ___', where the blank must be filled by the singular form of the word which is then *film*. Since this Arabic word is not given in the data we can only treat it as an

international word, just as we did in Problems 92 and 96, and conclude that it means the same as in English. *Fulaym* would mean then 'small film' (actually, it is 'short film' but we are close enough).

Problem 139. A simple and straightforward 'kibuzi', this problem is solved with the help of the following matched table:

	m- 'neutral size'	ji- 'big'	ki- 'kibuzi'
tu 'man'	+	+	
buzi 'goat'	+		+
to 'river'		+	
geni 'guest'	+		

(The first problem of this kind ever devised by the group, it lent one of its words for the name of the type - for no particular reason.)

Problem 140. After the English words are properly grouped according to similarities of meaning: 'to crumble - to shake off (make something fall down) - a fall', 'to climb up - a climb', 'a look - to attract attention (make somebody look)', 'to infuriate', 'an awakening', it is easy to observe that these five IDEAS occur in one of the three forms: a simple (self-reflexive, i.e. the action is performed by the agent - cf. Problem 125) verb, a causal verb (i.e. making somebody or something perform the action) and a noun. The usual frequency-related considerations produce the following matched table:

	# Simple verb	-isha 'Causal verb'	ku- 'Noun'
pukuta 'fall'	+	+	+
tazama 'look'		+	+
panda 'climb'	+		+
amka 'awakening'			+
tuna 'infuriate'		+	

Problem 142. It is easy to see that the only way to divide each Japanese word into two parts in such a way that there are only four different elements altogether is the one which yields the following inventory: *gi*, *ki*, *tzugi* and *we*. Two of these four elements are actually variants of the same element. Theoretically, there are six possibilities: a) *gi=ki*, b) *gi=tzugi*, c) *gi=we*, d) *ki=tzugi*, e) *ki=we*, and f) *tzugi=we*. The table below shows that on the assumption of 5 of the 6 hypotheses some two Japanese words would consist of two variants of the same element and can then be expected to mean exactly the same thing, which would contradict the assignment:

Assuming Hypothesis:	"Identical" Japanese Words are Nos:
b	2, 5
c	2, 4
d	3, 5
e	1, 4
f	1, 3

The only hypothesis which avoids this contradiction is (a). Therefore, *gi* and *ki* are variants of the same element.

Problem 151. The problem is somewhat similar to Problem 89 and is solved with the help of similar reasoning. It is easier, however, because it is given to us that, in terms of that previous problem, all the numerals on the left are primitive. The ones on the right belong to one of the three types: *dzyu*, *dzzyu* or *dzyu*. Again, they must be similar to the English 'sixteen', 'sixty' and 'sixty-six'. The only different numeral on the right is *yatzu* and it is primitive. There are limited possibilities for the first equation since the factors are different - it is either $2 \times 3 = 6$ or $3 \times 2 = 6$ or $2 \times 4 = 8$ or $4 \times 2 = 8$; in other words, *yatzu* is either 6 or 8. From the fourth equation it follows that *yondzyu* is a round number (like 'sixty'): it cannot be a compound of the 'sixty-six' type because it consists of two elements only and it cannot be a teen number because in that case *itzutzu* has to be either 2 or 3 and the product of the second equation has to be a primitive number, which it is not. If *yondzyu* is a round number then *itzutzu* is 5, no matter whether *yatzu* is 6 or 8. *Nidzyugo* is then $2 \times 10 + 5 = 25$, assuming, of course, that *dzyu* is 10. Comparing third and sixth equations, where the products consist of the same elements in the opposite order, and going over all the possibilities with *yatzu* being 6 or 8, we will see that they must stand for $8 \times 9 = 7 \times 10 + 2 (=72)$ and $9 \times 3 = 2 \times 10 + 7 (=27)$, which yields, besides *yatzu*=8, *mitzu*=3, *kokonotzu*=9, the fact that *futatzu* and *yotzu* from the first equation are either 2 or 4. It follows from the last equation, however, even though it is incomplete, that *yotzu* cannot be 2 since no primitive number multiplied by 2 can produce a compound number of the 'sixty-six' type, for all of these are greater than 20. The fifth equation then yields *mutzu*=6 since this is the only yet unoccupied primitive number which, multiplied by 3, gives a teen product. For simple arithmetical reasons, the products of the last two equations are identified as 81 and 32, respectively. The results can be gathered in the following table:

Number	Primitive Numeral	Within a Compound Numeral
1		iti
2	futatzu	ni
3	mitzu	san
4	yotzu	yon
5	itzutzu	go
6	mutzu	
7		siti
8	yatzu	hati
9	kokonotzu	

The blanks are filled then with *godzyuyon* (54), *kokonotzu* and *yatzu*, respectively.

Problem 153. Comparing the Japanese words borrowed from English with each other and working from the more obvious to the more problematic ones, we can observe various sound regularities between Japanese and English, e.g., *dz=z* or *j*, *syon=tion*, *a=any* English vowel followed by an *r*, etc. The Japanese words are then easily identified as meaning:

resonance, optimist, pen, engine, made in Japan, yankee, notebook, soup, *New York Times*, section, motor, doctor, zigzag, ticket, induction, shock, shop, block, balance, whiskey, mile, oil, slogan, library, evening, vandalism, interview, percent, massage, bar, star, attraction, over-coat, speed, journalism.

Obviously, it is the English pronunciation, not the spelling, which is conveyed in appropriate Japanese sounds, which may be, and are, quite different. Now, relating the sounds and sound sequences of the English words from the assignment to the English words above, we can approximate their Japanese forms:

erebeta, siru, yado, boruto, kukku, torasuto, kuren, nobu, bikuta, kuraku, rakee, sapa, era.

FOOTNOTES

¹ Besides the 16 sets of brochures rotaprinted before each competition by the Moscow University Press in 1965-80, an academic edition of the first 7 competitions (without solutions) was undertaken in 1972 - see B.Yu.Gorodetzkiy and V.V.Raskin (eds.), *200 zadach po yazykovedeniyu i inate-matike / 200 Problems on Linguistics and Mathematics/*, Moscow University Press. See also B.Yu.Gorodetzkiy, A.E.Kibrik, A.K.Polivanova, and V.V.Raskin, "Ob odnom klasse lingvisticheskikh zadach" /On a class of linguistic problems/, in *Problemy prikladnoy lingvistiki*, Moscow: Institute of Foreign Languages, 1969, Pt. 1, pp.107-11. Many problems with solutions have been published in such Russian counterparts of *Scientific American* or *Nature* as *Nauka i zhizn'*, *Znanie - sila* and *Kvant*. A few of the first publications of the problems in those journals were promptly translated into French by Y.Gentilhomme - see *Etudes de linguistique appliquée*, 4, 1966. Finally, four of the problems discussed above, Nos. 67, 92, 107, 130, 142, were published in my "On the use of linguistic problems in linguistic education", in G. Hudson (ed.), *Linguistics and the University Education*, East Lansing: Michigan State University, 1980, pp. 183-96.

² Which consisted of V.M.Alpatov, B.Yu.Gorodetzkiy, A.E.Kibrik, S.V.Kodzasov, A.K.Polivanova, V.(V.)Raskin, A.A.Raskina, E.N.Savvina, A.D.Ventzel, A.A.Zaliznyak, A.N.Zhurinskiy and a few others.

³ See also Methodological Appendix 6 in Gorodetzkiy and Raskin, 1972.