

**RUSSIAN -СЯ VERBS, IMPERSONALLY USED VERBS
AND SUBJECT/OBJECT AMBIGUITIES**

by

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1. INTRODUCTION

THE objective of this study is to devise criteria for automatic selection of proper English equivalents for Russian constructions containing -ся verbs, the so-called "reflexive" verbs, on the basis of their context and of their lexical and syntactic properties as determined by predictive syntactic analysis, and to examine certain related questions. Proposed algorithms have not yet been programmed and tested in automatic operation, but examples of their application indicate high probability of their useful application within the limitations of the aspects discussed below.

Workable provisions and coding for a reasonably correct automatic translation of "impersonally" used verbs, that is those verbs - both -ся and non-ся which do not have a subject or actor, ** have long seemed desirable. The provisions given in *Flowchart II* are based upon an extensive number of examples of both written and oral use. Although they, as well as other provisions in this paper, are not intended to be limited to scientific texts alone, they are, as yet, open to modifications.

In certain contextual circumstances the object of a transitive verb is consistently and erroneously selected and retained by the current Harvard syntactic analyzer as the subject of a sentence. The occurrence of this error is due (a) to the relative flexibility of word order in Russian sentence construction; and (b) to the fact that many Russian nominals have identical forms for their nominative and accusative cases. *Flowchart I* in Appendix 3 defines a relatively simple procedure which, on the basis of the

* This study has been supported in part by the National Science Foundation and is based on earlier work described by Lynch. 3,4.

** Term "actor" is to apply to any of the following: subject of a personal verb; dative actor of subjectless infinitive or "0" adjective; subject of the personal verb following initial gerund, preceding noninitial gerund; master of a participle.

syntactical and lexical properties of the nominal and the context in which it is used, reduces the number of such errors to a minimum.

2. THE NATURE OF THE RUSSIAN -СЯ VERB

The verb is a word which presents its semantic content in the guise of an action or process, as progression or development. The Russian verb further presents each action as having a single termination, as perfective, or, without this specification, as imperfective. Besides the category of person, which defines the relations of the participants in the process in terms of the utterance itself, there are means of expressing relations between the process denoted by a verb and the participants (namely the actor and any goal or goals) without any reference to the utterance itself; this is the category of voice.

A different assignment of roles by a shift of emphasis from one participant to another can be achieved by added the suffix -СЯ to certain verb forms. The general meaning introduced by the presence of -СЯ in a verb is a difference in verbal voice, that is a change in the relationship between the process denoted by the verb, and the participants in this process. Practically all the Russian non-ся verbs may appear, in one form or another, in one meaning or another, with the added suffix -СЯ. By no means, however, does every -ся verb also exist in the corresponding non-ся form.

The automatic translation of the verbs which do not exist without the -ся * (e.g., бояться, надеяться, нравиться, гордиться.) presents no difficulty; as it does not depend on their syntactic environment. These verbs are entered in the Harvard Automatic Dictionary in their only existent form, that with the -ся, and the corresponding English equivalents are given in the order of their estimated frequency of occurrence.

The effects of the addition -СЯ a non-СЯ verb are complex and varied,³ The general effect of -ся on all the verbs is that of elimination of a participant and of a stronger emphasis on the process itself. The resulting semantic changes then depend on the lexical properties of the verb itself, and on contextual circumstances. Some verbs may, through the addition of -СЯ, change their original meaning completely. Some add to their original non-ся meaning of passivity, ** reflexivity proper, or reciprocity. All the -ся forms of verbs may conceivably be used "impersonally.

* To be referred to hereafter as "R" verbs.

** Generally, this happens with imperfectives only, or with several properly coded perfectives.

Transitive verbs which may change their meaning through the addition of -ся do so, normally, whenever they are (1) perfective (он оказал нам услугу - он оказался русским); and when (2) imperfective with animate subject (товарищи прощают друг другу - товарищи прощаются навсегда). When the subject is inanimate, such an imperfective verb can only be used passively and in the original non-ся meaning (такие грехи редка прощаются). A passive construction with animate subject is also possible, especially for generalizations, but less frequent. If the verb is used impersonally, the original non-ся meaning is retained, except for several unique cases which are coded accordingly (see Appendix 1, character position 8).

A Russian transitive verb can, with reasonable certainty, be translated into English passive whenever the subject is possibly inanimate * (1) if the verb is imperfective and retains its non-СЯ meaning for its -СЯ form (Машина движается паром; (2) if, in the type of texts we deal with at present, the verb has identical forms for its perfective and imperfective aspects (бомбы explodes детонаторами); or (3) if it is one of several perfectives which may be used passively - without regard to whether it changes or retains its meaning with the addition of -ся (все это скоро забудется). If the verb is definitely perfective or if the subject of an imperfective verb is definitely animate, the active translation is likely to be the correct one (лампа разбилась; он любит целоваться). If an imperfective transitive verb is used with an animate subject, the possibility of it being a passive presentation is not excluded but less probable.

The intransitive verbs which may change their meaning through the addition of -ся do so (дело у него не спорилось), unless they are used impersonally (все хотели спорить, да мне не спорилось). If an intransitive verb cannot change its meaning, the presence of -СЯ merely shifts the emphasis to the process itself. The subject is either eliminated (парус белеет - что-то там белеется) or the goal of the action denoted by the verb is considerably weakened or entirely lost (он стучит в дверь - он все стучится). There is no urgent necessity to modify the English translation of the -ся form of intransitive verbs which cannot change their meaning. The only thing lost in translation is a certain vagueness, a sense of detachment.

* For the purposes of automatic translation: this class of subjects includes pronouns and inanimate nouns, but not adjectives used nominally since these tend to refer to animates.

3. AUTOMATIC DETERMINATION OF PROPER TRANSLATION OF RUSSIAN -СЯ VERBS

It is proposed to enter in the dictionary file only the non-ся form of any Russian verb which conceivably could occur either without or with the suffix -ся, * regardless of the effect the addition of -ся may have on the given verb in different contextual environments and to provide a code that will allow a correct modification of the English correspondents to be made automatically whenever the -ся form is encountered in a text, taking into consideration the contextual modifications and changes by means of algorithms proposed in this paper.

All the verbs are to be coded as to their aspect; as to whether they are intransitive, transitive, weakly transitive, or auxiliary; as to whether or not they may change their meaning through the addition of -ся and if yes, whether or not their -ся meaning may be used impersonally (with a majority of verbs it may not); whether or not their impersonal forms ought to be translated as "it...;" whether or not a perfective verb may be used as passive (with a majority of verbs it cannot); whether or not their -СЯ form may be used in reciprocal or joint meaning.

Verbs which do not change their meaning through the addition of -ся are given several English equivalents, identical for both their -ся, and non-ся forms, in order of their probable frequency of occurrence. *Flowchart I* (Appendix 3) analyzes every verb, whether -СЯ or non-СЯ and determines whether the verb should be translated impersonally. If yes, *Flowchart II* (Appendix 4) selects the most likely translation for the impersonally used verb. If not, and the verb is a -ся verb, it is referred to *Flowchart III* (Appendix 5) which determines whether active or passive is the most likely translation for the given verb for the given context. If the personal form of the verb has no -СЯ *Flowchart I* determines, if pertinent, whether the structure marked "subject" by the syntactic analyzer is to be translated as subject or as direct object (see Part 5).

If the verb is such that it may change its meaning through the addition of -ся, two separate sets of correspondents are to be given in the dictionary file: one, that of the non-ся form, the other, that of the -ся form.** (For examples, see the table of verbs in Appendix 6.) *Flowchart III* (Appendix 5) determines, whether in the given context the

* To be referred to hereafter as the "Δ" verbs

** Each set, of course, may include several possible English equivalents; these will be given, for each set, in the order of the likely frequency of their occurrence.

verb is likely to have been used in the changed meaning. Unless used impersonally, the intransitive verbs automatically are translated in the -ся meaning, as is the overwhelming majority of the transitive perfectives. The context of transitive imperfectives of verbs which have identical forms for both aspects, as well as of a few coded perfectives, is then analyzed for a possibility of a passive translation: whenever the subject is possibly inanimate, that is a pronoun or an inanimate noun, the passive translation in the non-ся meaning is the first choice, the active translation in the -ся meaning, the second choice. When the subject is definitely animate, the order is reversed.*

According to the proposed classification system, the "R" verbs, that is those that do not exist without the -ся comprise the marked, defined category. All the remaining verbs, consequently, do exist without the -ся and there is no specification as to their appearing or not appearing also in -ся form. They are unmarked. These unmarked "Δ" verbs substantially exceed in their number the "R" coded verbs, of which there are only about one thousand in the whole Russian language. The "Δ" verbs also constitute a productive category and will therefore grow in number as the language is being enriched, while the number of verbs belonging to the unproductive "R" category will at best remain the same. These two reasons, that is the size and the productivity of the class of the "Δ" verbs, are the decisive factors for their selection as the unmarked category.

Practically all the "Δ" verbs are more likely to occur without the -ся. When they do so, the need for the extensive algorithms is nullified, and the machine simply translates them "normally", that is, it does not subject them to the subsequent analysis. It is only when these verbs occur with the -ся that the testing algorithms are invoked to pinpoint those semantic properties and the syntactic situation of a given verb, which would call for a specific translation to be accepted as the correct one or the most likely one for the given text.

It is necessary, from the point of view of efficiency, to separate the "R" verbs, that is, those which may not occur without the -ся. If this were not done at the earliest opportunity, they, too, would be subjected to extensive algorithms that are superfluous for them, since contextual circumstances do not influence their meaning.

* In the matter-of-fact, scientific texts on which, at present, the efficacy of the dictionary file is being tested, the original non-ся meaning of this type of verbs is much more likely to occur whenever it is encountered in its -ся form. However, under the crude system in present experimental use at Harvard, the changed -ся meaning translation is consistently and erroneously picked up whenever a verb of this type occurs in its -ся form in the given text, without regard to its subject.

4. IMPERSONALLY USED VERBS

All verbs, with or without the -ся may be used in one or another form of "impersonal" presentation, that is, without a specified or clearly implied actor. There are several admissible forms, the second and third person singular, and the third person plural being the most common. All but the third singular can be sensibly translated by putting the proper English personal pronoun before the verb (смотришь и не знаешь ... - you look, and you do not know ...; говорят, что вы ... - they say that you ...).

When a non-ся third person singular verb is used impersonally with a direct object, the proper English translation is, usually, passive (крышу занесло снегом); when it is used without a direct object - the English translation is impersonal, "it" and the proper tense of the verb (вечереет, похолодало).

Practically every Russian "Δ" verb may be used in an impersonal third person singular -ся form presentation with the logical animate subject changed to a dative object or goal, or altogether omitted. The effect is that of the animate dative being vaguely influenced by the process of the verb. This presentation is particularly effective with the negated verbs (мне надо работать, да не работается). The English translation of such constructions, best suited for automatic translation, is nominative for the Russian dative (or: "one" if there is no dative), and (1) the personal form of the verb if an adverb or an infinitive is in the vicinity, or if a noun clause follows the verb (мне часто приходится иметь дело с...; брату хорошо живется); (2) the proper form of "feel like" and "-ing" form of the verb if no such adverb, infinitive or clause is present (e.g., мне не спится). If a verb may change its meaning through the addition of -ся it does not do so in this type of impersonal presentation (все спорят, а мне не спорится), except for several individual cases which have been properly coded (see Appendix 1 - character position 8): (вам придется прийти в другой раз, я занят; не знаю, доведется ли нам увидеться)

Such impersonal third person singular -ся constructions with or without animate dative are not common in scientific texts but have limitless possibilities in colloquial use. Any verb which may feasibly be used in the manner described in the above paragraph has been left unmarked, while verbs which in the same form must or are likely to be best translated by the English impersonal "it" have been properly coded (see Appendix 1, character position 9).

If all Russian verbs, when entered into an automatic dictionary file,

are properly coded by a well-qualified linguist, it can be expected that Flowchart II will be highly effective.

5. SUBJECT/OBJECT AMBIGUITIES

The word order of a sentence or clause in Russian can, generally speaking, be expected to be similar to that of English. However, English word order is quite rigid, to compensate for its limited morphological content. The Russian language, on the other hand, with its expansive means for morphological expression, allows somewhat greater flexibility in sentence construction to achieve a greater or lesser emphasis of different words and units. This freedom in word order may be observed in its extreme in conversational, emotional, or poetic language, and to a lesser degree in descriptive texts. The juxtaposition of the syntactic object and subject is the one we are concerned with here, as it may and in certain instances does result in an incorrect automatic translation.

Many Russian nouns have identical forms for their nominative and accusative cases. In the present system of syntactic analysis as used at Harvard Computation Laboratory an ambiguous accusative is, erroneously, selected and retained as the subject whenever (a) the transitive verb is in an Impersonal form which happens to be of the same number and person/gender as the initial accusative object erroneously selected as subject (в научных работах иногда пишут несообразные глупости); (b) the transitive verb is in a personal form of the same number and person/gender as the ambiguous accusative, with the actual subject (which, in turn, also has a nominative accusative ambiguity) following the accusative, immediately or not (в локационной технике большое распространение получило применение для этой цели электроннолучевых трубок ...); or (c) the verb is intransitive and therefore excludes accusative object but is followed by a transitive infinitive whose accusative object is ambiguous in form. Both situations described above under (a) and (b) can occur under (c) circumstances (качество производства следует повысить во всех колхозах; такие вопросы стараются уже давно решить самые выдающиеся умы в мире)

Whenever subject and object both have identical forms for their respective nominative and accusative cases and are of the same number and person/gender, the Russian language normally preserves the order of subject - predicate - accusative object. However, if the semantic content of such a sentence admits it, the conventional order may be broken for the purposes of emphasis. In scientific texts, the juxtaposition of ambiguous subject and

object is a rare but not impossible occurrence. In *Flowchart I* (Appendix 3), the possibilities of erroneous automatic selections of subject and object are narrowed down, and two translations are admitted in the order of their probable frequency of occurrence: (a) for the normal order of subject first then object, and (b) for the exceptional cases of an ambiguous object preceding an ambiguous subject. The application of the algorithm of *Flowchart I* should reduce to a minimum the necessity for a final manual selection of a proper translation for sentences with subject/object ambiguities.

Whenever both subject and object follow the predicate, the verb "ИМЕТЬ" behaves, syntactically, somewhat differently from other verbs. With other verbs, if subject and object both have identical forms for their nominative and accusative cases, and both are of the same number and person/gender as the verb, the order is normally that of subject first. With "ИМЕТЬ" the order is reversed. The object is more closely subjugated to the verb, and must follow the verb immediately while the subject follows the object. This seems to be a consistent occurrence, and has been provided for in Boxes 24, 25, 23, and 26 of *Flowchart I*.

APPENDICES

1. Proposed Code

The following format, *table I*, is proposed for coding Russian verbs in regard to their -СЯ forms, impersonal usage, and detection of errors in the machine selection of subject. It can easily be adapted to and incorporated into the Organized and Semiorganized Word coding system used in the Harvard Automatic Dictionary* or to any other coding system designed for any machine.

TABLE 1
PROPOSED CODE

Character position	1	2	3	4	5	6	7	8	9	10	11	12
Code	V	N	R	R	I			B	U	V	S	
		S	Δ	O	T			0	0	0	0	
		U			0							
		M			A							
		K										

* See Bibliography 2. Also 6, No. NSF-2, Section III.

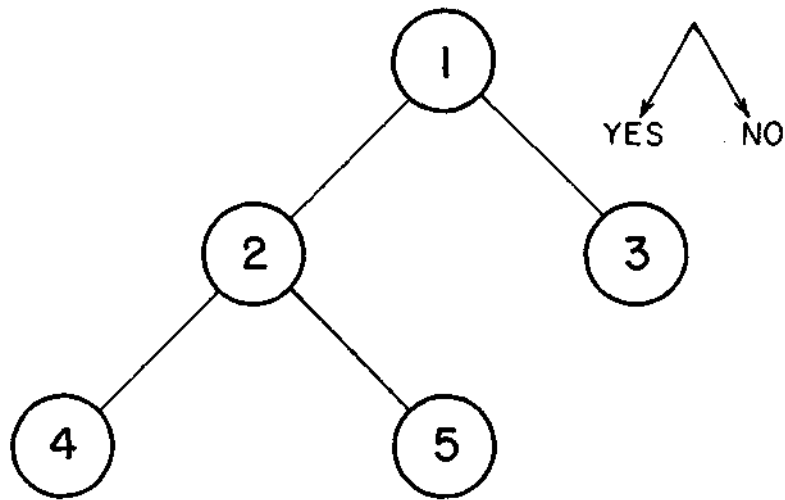
Definition of the Proposed Code

- CP1* - V - "verb"
- CP2* - N - imperfective aspect
S - perfective aspect
U - momentary action
M - oscillating aspects, i.e., iterative action
K - identical forms used for both imperfective and perfective aspects
- CP3 - R - verb does not exist without the -ся
A - otherwise
- CP4 - R - "Δ" verb which may or does change its meaning through the addition of -ся
0 - otherwise
- CP5** - I - intransitive verb which may not take accusative object
T - transitive verb which may take accusative object and is likely to do so
0 - weakly transitive verb - it may take accusative object but is not expected to do so
A - auxiliary verb
- CP8 - B - verb which must be translated in its -ся meaning when used impersonally
0 - otherwise
- CP9 - U - verb whose third person singular impersonal -ся form is to be translated as "it ...," and the proper form of the verb
0 - otherwise
- CP10 - V - verb which may have reciprocal or joint meaning in its -ся form
0 - otherwise
- CP11 - S - transitive perfective verb which may be used passively in its -ся form
0 - otherwise
-

* Code in CP1 and CP2 is used at present

** This detailed coding is desirable for detecting in Flowchart I possible errors in machine selection of subject. Otherwise, the subdivision of all verbs into those that may not take accusative object (intransitive), and "otherwise", that is those that may, seems sufficient for the purposes of automatic translation.

2. Preliminary Flowchart



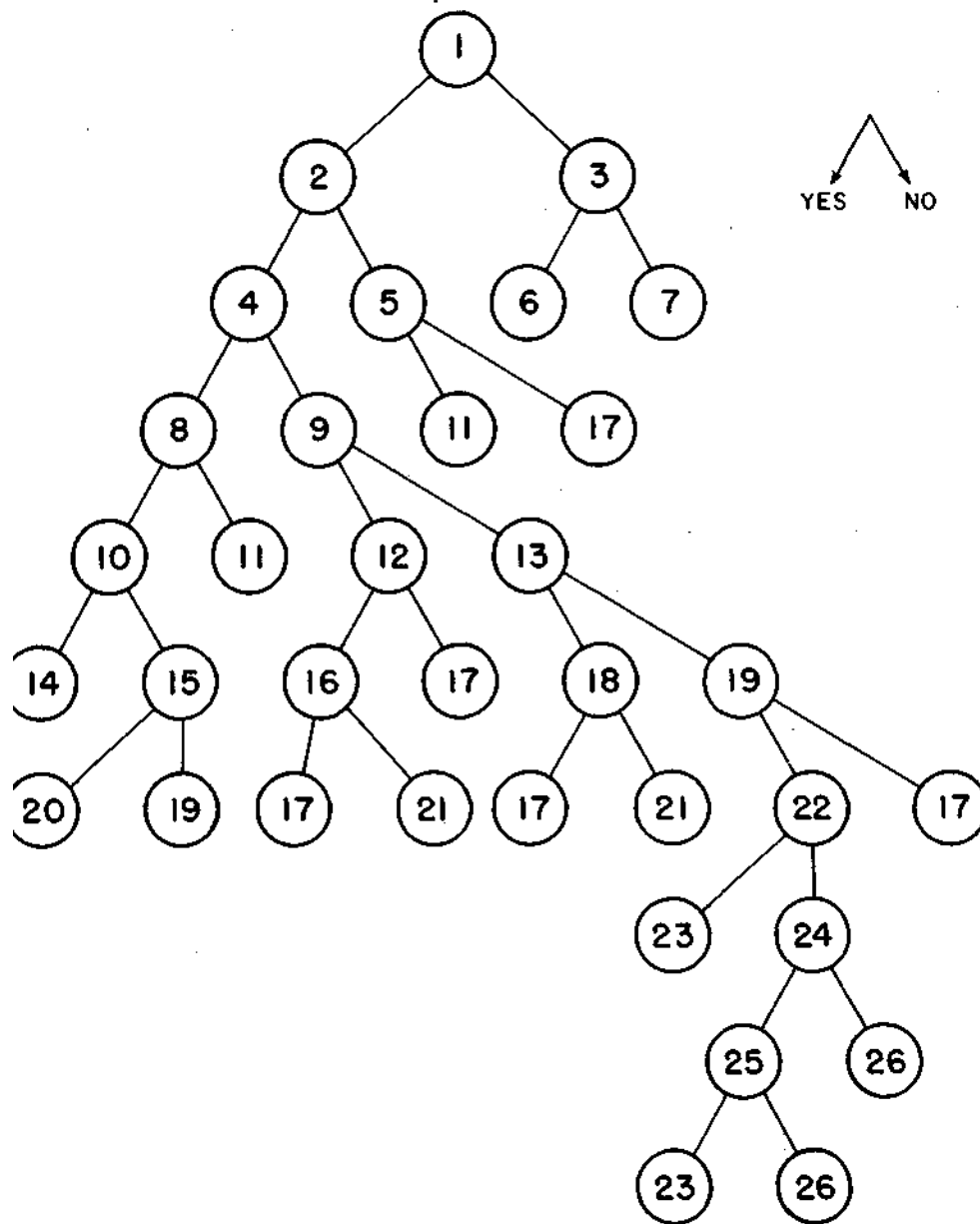
PRELIMINARY FLOWCHART

Definition of Preliminary Flowchart

1. Text verb infinitive or gerund or participle?
2. Text verb ends in -СЯ or -СЬ ?
3. To Flowchart I.
4. To Flowchart III Box 4.
5. Translate normally.

Infinitives, gerunds, and participles are, for obvious reasons, not to be subjected to the algorithms which determine whether the selection of subject has been made properly, or whether the verb is used impersonally. This Preliminary Flowchart has been devised to separate these forms before the verb is referred to Flowchart I. Infinitives, gerunds, and participles are then to be translated "normally" unless they end in -ся. The -ся verbs will be subjected to Flowchart III, Box 4, where the proper English equivalent is then determined from their coding.

3. Subject/Object Ambiguities



Flowchart I

Definition of Flowchart I

1. Has the verb or the "0" adjective* a subject?
2. Has the selected subject or actor a nominative/accusative ambiguity?
3. Is the verb in third person, singular or plural? Or is the predicate an "0" adjective?
4. Personal text verb ends in -СЯ or -СЬ ? Or is predicate an "0*" adjective (but not participle)?
5. Verb ends in -СЯ or -СЬ?
6. To Flowchart II (impersonal).
7. Translate subjectless verb in appropriate personal form.
8. Does a non-ся infinitive precede or follow the personal -ся verb or the "0" adjective?
9. "I" or "0" in CP5? (Verb intransitive or accusative object optional or unlikely?)
10. Non -ся infinitive has "I" or "0" in CP5?
11. To Flowchart III (-СЯ verbs).
12. A non-ся infinitive precedes or follows the verb?
13. Is there an unfulfilled accusative object prediction?
14. Translate the ambiguous subject as subject, then proceed according to Flowchart III.
15. Is there an unfulfilled accusative object prediction to the non-ся infinitive?

* "0" adjective refers to the short form of a neuter adjective used as a predicate, with or without verb "быть".

** "Predicate" refers to either "predicate head" or "verb complement" in the terminology of the Harvard Syntactic Analyzer.10

16. Non-ся infinitive has "I" or "0" in CP5?
17. Translate normally, that is the selected subject as subject.
18. Does a noun clause or an infinitive follow the verb?
19. Does selected object have subject/object ambiguity?
20. Translate selected subject as object, putting it after the predicate. Proceed according to Flowchart II.
21. Proceed according to Flowchart II, Box 6.
22. Is the ambiguous selected object animate?
23. Translate: (a) the Initial ambiguity as object, the second ambiguity as subject placing it before the verb
(b) vice versa

If the verb ends in -СЯ or -СЬ translate it according to Flowchart III, Box 4.
24. Is the verb "ММЕТЬ?"
25. Do both subject/object ambiguities follow "ММЕТЬ?"
26. Translate: (a) the initial ambiguity as subject, the second ambiguity as object.
(b) vice versa, putting subject before the verb, object after.

If the verb ends in -СЯ or -СЬ translate it according to Flowchart III, Box 4.

Examples for Flowchart I

NB.: The following explanations are to apply to the examples for all three Flowcharts:

Path: Roman numerals define Flowcharts; Arabic numerals define path followed by the verb in the Flowchart.

Translation given must not be taken to show what the machine does at present. For the verbs, it is made up according with the provisions of

the Flowcharts. For the other features, the translation given is fictitious; if done automatically, it will vary according to the provisions made by various coding systems for various machines.

References in parentheses are abbreviations used in Harvard Computation Laboratory. Complete references are given in Progress Report No. NSF-4, Section II⁶

1. Эти точки будем нумеровать римскими цифрами
(Text 001-0498) I: 1-3-7: These points we shall number with Roman numbers.
2. Дальнейшее развитие вычислительной техники привело к созданию специализированных машин для...
(Text W03-3209), I: 1-2-4-9-12-17: Further development of analytical technology led to creation of specialized machines for
3. Учет статистических свойств исходного сообщения предполагает, что наиболее часто встречающиеся сообщения кодируются наиболее краткими кодовыми комбинациями (Text W04-0060), first verb, I: 1-2-4-9-13-18-17; the second verb, I: 1-2-4-8-11; then III: 1-2-5-8-10-13: Calculation of statistical characteristics of initial communication supposes, that most frequently met communications are coded by shortest coding combinations.
4. Разъяснение парадокса позволяет понять смысл многих гидромеханических теорий.... (Text 011-0138), I: 1-2-4-9-13-19-22-24-26: Elucidation of paradoxes allows to understand the meaning of many hydro-mechanical theories
5. Письмо пишет дочь I: 1-2-4-9-13-19-22-23: Daughter writes (a) letter.
6. он хорошо пишет I: 1-2-5-17: He writes well.
7. Иначе все изложенное имело бы смысл только в тривиальном случае (Text внн-1229), I: 1-2-4-9-13-19-22-24-25-26: Otherwise everything stated would have sense only in a trivial case.
8. Легко показать, что имеет место ассоциативность умножения, и что ... (Text АНН-1286), I: 1-2-4-9-13-19-22-24-25-23: It is easy to show that associativeness of multiplication has place, and that

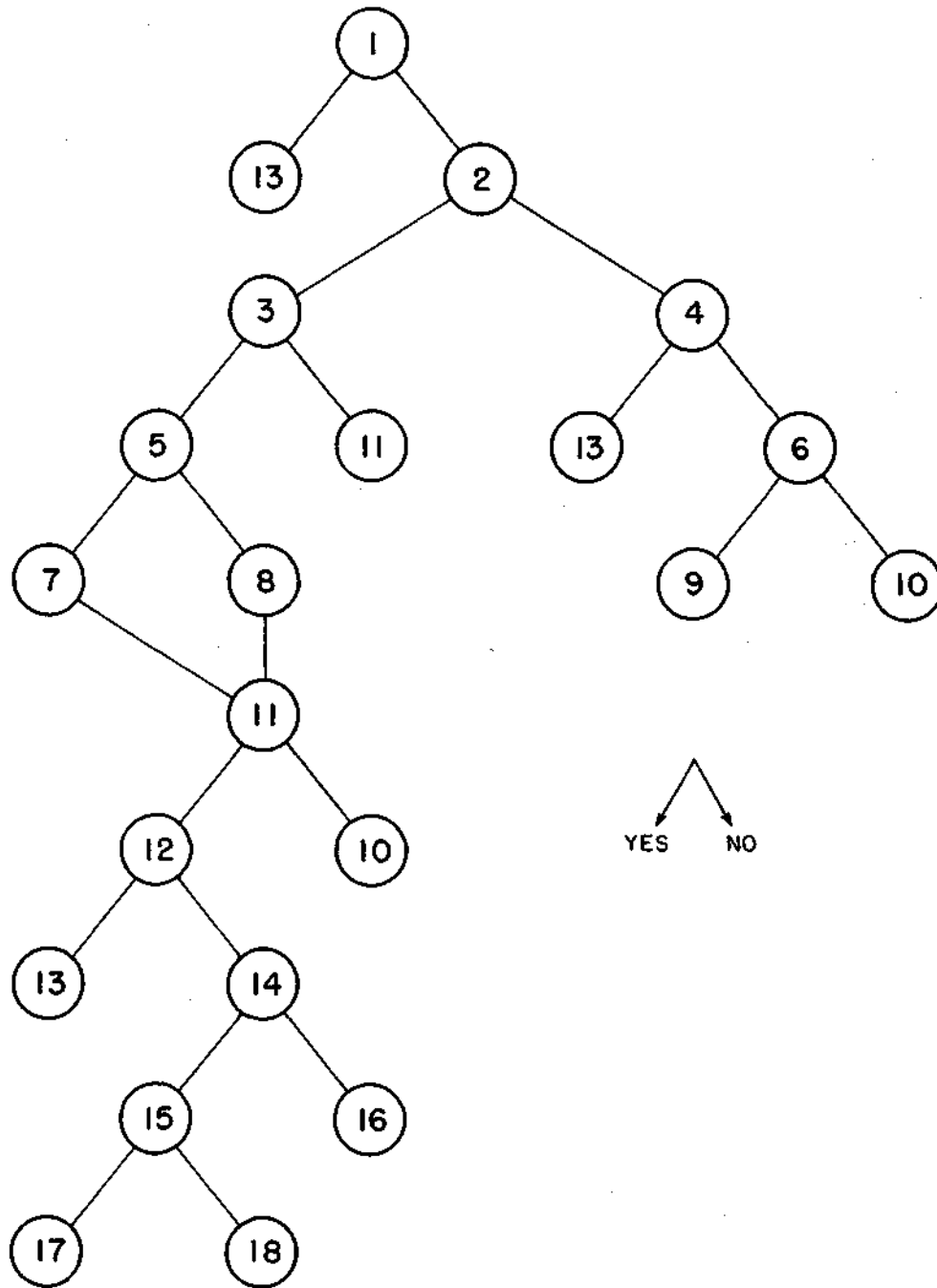
9. В локационной технике большое распространение получило применение для этой цели электронно-лучевых трубок с длительным послесвечением экрана (Text OOA-0212), I: 1-2-4-9-13-19-22-24-26b: In radiolocational technology, application for this purpose of tubes with prolonged afterglow of screen received great propagation.

N.B.: See also Examples in Flowcharts II and III.

4. *Impersonally Used Verbs*

Definition of Flowchart II

1. Verb has "R" in CP3 and "U" In CP9? Or is predicate an "0" adjective?
2. Text verb ends in -СЯ or -СЬ?
3. "R" in CP4? (Can -СЯ form have a changed meaning?)
4. "I" or "0" in CP5? (Verb intransitive or weakly transitive).
5. "B" in CP8? (Impersonals translated in changed -СЯ meaning.)
6. Text verb in singular?
7. Proceed to 11 translating in -СЯ meaning.
8. Proceed to 11 translating in non-СЯ meaning.
9. Translate: (a) passively
(b) normally, that is the ambiguous subject, when existent, as subject; the verb in active form
10. Translate: (a) the ambiguous subject, when existent, as object, putting it after the verb, and preceding the verb with "they".
(b) normally
11. Is text verb in singular?
12. "U" in CP9? (Verb to be translated as "it".)



Flowchart II

13. Translate impersonally: ("It ...," etc.).
14. Text verb preceded or followed by dative pronoun or animate noun?
15. Text verb preceded or followed by adverb or by Infinitive?
16. Translate: "one ...," etc.
17. Translated Russian dative as English nominative, the verb in corresponding personal form.
18. Translate Russian dative as English nominative, then the corresponding form of "feel like", then the verb in its English "-ing" form.

Examples for Flowchart II

1. Присутствие метеоров меньших размеров можно наблюдать на экранах радиолокационных станций (Text W02-1567), I: 1-2-4-8-10-15-20; II: 1-13: It is possible to observe presence of meteors of lesser magnitude on screens of radiolocational stations.
2. Мне кажется, что прикладная математика представляет собой какую-то новую ... область нашей науки (Text ZZZ-0706), I: 1-3-6; II: 1-13: It seems to me, that applied mathematics presents some new ... sphere of our science.
3. Нам представляется, что математический анализ таких гипотез ... заостряет внимание широких кругов специалистов ... (Text OII-0281), the first verb, I: 1-3-6; II: 1-2-3-5-7-11-12-13; the second verb, I: 1-2-4-9-13-19-17: It seems to us, that mathematical analysis of such hypotheses ... sharpens attention of wide circles of specialists ...
4. Брату хорошо живется, I: 1-3-6; II: 1-2-3-11-12-14-15-17: Brother lives well.
5. Мне не спится. I: 1-3-6; II: 1-2-3-11-12-14-15-18: I do not feel like sleeping.
6. Он не спорит с вами, так как ему сегодня не спорится, I: 1-3-6; II: 1-2-3-5-8-11-12-14-15-18: He does not

argue with you since he doesn't feel like arguing today.

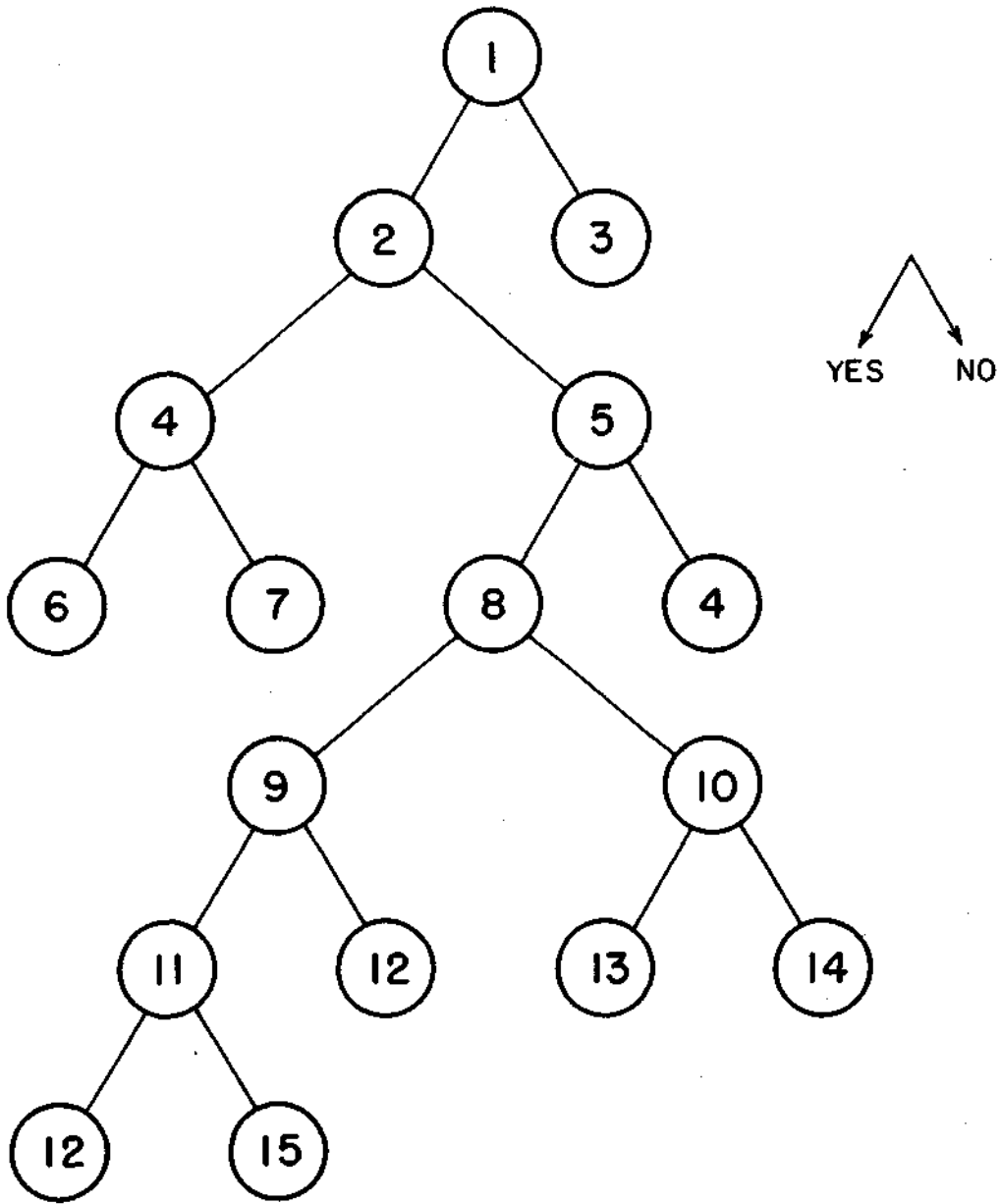
7. Размеры этих зерен удалось определить прямыми измерениями (Text W02-0588), I: 1-3-6; II: 1-2-3-11-12-14-16: One succeeded to define sizes of these kernels by direct measurements.
8. В заключение следует указать на проблемы ... (Text OGG-1369), I: 1-3-6; II: 1-2-4-13: In conclusion, one ought to point to problems
9. Долгое время было принято считать, что радиоволны короче 10m от ионосферы вообще не отражаются (Text W02-H81), the first verb, I: 1-2-4-9-12-16-21; II: 6-9; the second verb, I: 1-2-4-8-11; III: 1-2-5-8-10-13: It was accepted for a long time to consider, that radio-waves shorter than 10 m. are generally not reflected from ionosphere.
10. Окно занесла снегом I: 1-2-4-9-13-18-21; II: 6-9: The window is * covered by snow.
11. Очевидно, что подобная задача возникает в химии, когда изучают процесс химической реакции (Text OOK-0284), the first predicate, I: 1-3-6; II: 1-13; the second, I: 1-3-6; II: 1-2-4-6-10: It is obvious, that a similar problem arises in chemistry, when they study the process of chemical reaction.

N.B.: See also Example 4 in Flowchart III.

* Under the present system used at Harvard Computation Laboratory, the English infinitive form of the verb is given regardless of the Russian tense or aspect used in text. The accompanying coding allows then a proper manual selection of the verbal form. In the future, we want to make a provision that English present tense be used whenever Russian past perfective verbs or Russian past perfective passive participles are to be translated into English passive:

окно	занесло	снегом	-	The window is covered by snow;
окно	занесено	снегом	-	The window is covered by snow.
				BUT
окно	было	занесено	снегом	- The window was covered by snow;
окно	будет	занесено	снегом	- The window will be covered by snow.

5. Russian -CЯ Verbs



Flowchart III

Definition of Flowchart III

1. "A" in CP3? (Does the verb exist without -ся)
2. "I" in CP5? (Is the non-ся verb intransitive)
3. Translate normally
4. "R" in CP4? (Can -ся form have changed meaning)
5. "N", "M", or "K" in CP2? (Verb possibly imperfective;) or "S" in CPU? (Perfective may be passive).
6. Translate in -ся meaning.
7. Translate normally.
8. "R" in CP4? (Can -ся form have changed meaning)
9. Subject or actor possibly inanimate?
10. Subject or actor possibly Inanimate?
11. Verb "иметься?"
12. Translate: (a) actively in -ся meaning.
(b) passively in non-ся meaning.
13. Translate: (a) passively
(b) actively
14. Translate: (a) actively
(b) passively
15. Translate: (a) passively in non-ся meaning
(b) actively in -ся meaning

Examples for Flowchart III

1. Он никогда не поступается своими правами,
I: 1-2-5-11; III: 1-2-4-6; He never waives his rights.

2. Зачем стучишься, все равно не откроют, I: 1-3-7;
III: 1-2-4-7: Why do you knock, all the same they won't open.
3. И там и здесь имеются клапаны (Text WOI-0160), I: 1-2-4-8-11; III: 1-2-5-8-9-11-12: Both there and here valves exist.
4. Сигнал, который необходимо передать, ...
обычно записывается на магнитную ленту (W02-2073), the first predicate, I: 1-3-6; II: 1-13; the second, I: 1-3-4-8-11; III: 1-2-5-8-9-11-15: The signal, which it is necessary to send, usually is written down on magnetic tape.
5. Такие грехи никому не простятся, I: 1-2-4-8-11;
III: 1-2-5-8-9-11-15; Such sins will be forgiven to none.
6. Дитя учится ходить, I: 1-2-4-8-10-14; III: 1-2-5-8-9-12:
Child learns to walk.
7. Товарищи простились навсегда, I: 1-2-5-11; III: 1-2-5-8-9-12: Comrades parted forever.
8. Мы редко встречаемся, I: 1-2-5-11; III: 1-2-5-8-10-14:
We seldom meet.
9. Он оказался русским I: 1-2-5-11; III: 1-2-5-4-6: He turned out to be a Russian.
10. Мы скоро встретимся I: 1-2-5-11; III: 1-2-5-4-7: We shall meet soon.
11. Такие вопросы стараятся уже давно решить
Самые выдающиеся умы в мире I: 1-2-4-8-10-15-19-22-24-26b; III: 4-7: The most extraordinary brains in the world have been trying to solve such questions for a long time. (The above example is one of rare cases where both subject and object are inanimate, both have subject/object ambiguity, but the normal order of sentence is still reversed.)

N.B.: See also Example 3 in Flowchart I:

See also Example 9 in Flowchart II.

6. Alphabetical Table of Russian Verbs used in Examples

Russian Verb	Proposed Code Word												English Equivalents non-СЯ or: -СЯ only meaning (When different)	
	1	2	3	4	5	6	7	8	9	10	11	12		
1. белеть	V	N	Δ	0	I			0	0	0	0			to look white
2. бояться	V	N	R	0	I			0	0	0	0			to fear, be afraid
3. вечереть	V	N	Δ	0	I			0	U	0	0			to grow to a close (for the day)
4. встретить	V	S	Δ	0	T			0	0	V	0			to meet
5. встречать	V	N	Δ	0	T			0	0	V	0			to meet
6. выполнить	V	S	Δ	0	T			0	0	0	0			to fulfill
7. глядеть	V	N	Δ	0	I			0	0	0	0			to look
8. говорить	V	N	Δ	0	0			0	0	0	0			to speak, to say, etc.
9. гордиться	N	V	R	0	I			0	0	0	0			to take pride (in)
10. двигать	V	N	Δ	0	0			0	0	0	0			to move
11. довести	V	S	Δ	R	0			B	0	0	S			to lead, to reduce, etc. to have occasion
12. жить	V	N	Δ	0	I			0	0	0	0			to live
13. забыть	V	S	Δ	R	T			0	0	0	S			to forget to forget one-self, to doze off
14. занести	V	S	Δ	R	T			0	0	0	0			to bring, to cover, etc. to be carried off (too far)
15. записывать	V	N	Δ	R	T			0	0	0	0			to write down, to enroll to note
16. знать	V	N	Δ	R	0			0	0	0	0			to know to associate
17. иметь	V	N	Δ	R	A			0	U	0	0			to have to exist
18. казаться	V	N	R	0	I			0	U	0	0			to seem
19. кодировать	V	K	Δ	0	T			0	0	0	0			to code
20. наблюдать	V	N	Δ	0	T			0	0	0	0			to observe
21. надеяться	V	N	R	0	I			0	0	0	0			to hope

Russian Verb	Proposed Code Word												English Equivalents		
	1	2	3	4	5	6	7	8	9	10	11	12	non-СЯ only	or: meaning	-ся (when different)
22. нравиться	V	N	R	0	I			0	0	0	0			to please	
23. нумеровать	V	N	Δ	0	T			0	0	0	0			to number	
24. оказать	V	S	Δ	R	T		B	U	0	0			to extend	to turn out (to be)	
25. оказывать	V	N	Δ	R	T		B	U	0	0			to extend	to turn out (to be)	
26. основать	V	З	Д	0	T			0	0	0	0			to base	
27. отражать	V	N	Δ	0	T			0	0	0	0			to reflect	
28. передать	V	S	Δ	0	T			0	0	0	0			to pass, to send	
29. писать	V	N	Δ	0	T			0	0	0	0			to write	
30. получить	V	S	Δ	R	T		B	U	0	S			to receive	to come out, to turn out	
31. позволять	V	N	Δ	0	T			0	0	0	0			to permit	
32. поступать	V	N	Δ	R	T			0	0	0	0			to act, to treat	to waive (one's rights)
33. похолодать	V	S	Δ	0	I			0	0	0	0			to have grown cold	
34. предполагать	V	N	Δ	0	T			0	0	0	0			to suppose	
35. представлять	V	N	Δ	R	T		B	U	0	0			to present	to seem, to in- troduce oneself	
36. привести	V	S	Δ	R	0		B	U	0	0			to bring, to lead	to happen, to chance	
37. прийти	V	S	Δ	R	I		B	0	0	0			to come, etc.	to have to, to fit, to suit	
38. принять	V	S	Δ	R	T			0	0	0	0			to accept	to takee
39. приходиться	V	N	Δ	R	I		B	0	0	0			to come, etc.	to have to, to fit, to suit	
40. простить	V	S	Δ	R	0			0	0	V	S			to forgive	to part
41. прощать	V	N	Δ	R	0			0	0	V	0			to forgive	to part
42. работать	V	N	Δ	0	I			0	0	0	0			to work	
43. разбить	V	S	Δ	R	T			0	0	0	0			to break	to bruise

Russian Verb	Proposed Code Word												English Equivalents	
	1	2	3	4	5	6	7	8	9	10	11	12	non-СЯ or: only meaning	-СЯ (when different)
44. решить	V	S	Δ	R	T	0	0	0	S	to solve, to decide	to dare			
45. следовать	V	N	Δ	0	I	0	0	0	0	to follow, (if with infini- tive, imper- sonal: one ought to..."				
46. спать	V	N	Δ	0	I	0	0	0	0	to sleep				
47. спорить	V	N	Δ	R	I	0	0	0	0	to argue	to turn out well, to give good results			
48. стараться	V	N	R	0	I	0	0	0	0	to try, to attempt				
49. стучать	V	N	Δ	0	I	0	0	0	0	to knock				
50. считать	V	N	Δ	R	0	0	0	0	0	to consider, to be consid- to count	dered			
51. удался	V	S	R	0	I	0	0	0	0	to succeed				
52. указать	V	S	Δ	0	0	0	0	0	0	to point				
53. учить	V	N	Δ	R	0	0	0	0	0	to teach	to learn, to study			
54. хотеть	V	N	Δ	R	0	0	0	0	0	to wish	to feel like			
55. целовать	V	N	Δ	0	T	0	0	V	0	to kiss				
56. взорваться	V	K	Δ	0	T	0	0	0	S	to explode				

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