THE LEXICON: A SYSTEM OF MATRICES OF LEXICAL UNITS AND
              THEIR PROPERTIES*

- Harry H. Josselson -

Uriel Weinreich /1/, in discussing the fact that at one

time many American scholars relied on either the discipline

of psychology or sociology for the resolution of semantic

problems, comments:

> In Soviet lexicology, it seems, neither the tra-
> ditionalists, who have been content to work with
> the categories of classical rhetoric and 19th-
> century historical semantics, nor the critical
> lexicologists in search of better conceptual tools,
> have ever found reason to doubt that linguistics
> alone is centrally responsible for the investiga-
> tion of the vocabulary of languages. /2/

This paper deals with a certain conceptual tool, the matrix,

which linguists can use for organizing a lexicon to insure

that words will be described (coded) with consistency, that

is, to insure that questions which have been asked about

certain words will be asked for all words in the same class,

regardless of the fact that they may be more difficult to

answer for some than for others.   The paper will also dis-

cuss certain new categories, beyond those of classical

rhetoric, which have been introduced into lexicology.

1.   INTRODUCTION

The research in automatic translation brought about by

the introduction of computers into the technology has

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engendered a change in linguistic thinking, techniques, and
output. The essence of this change is that vague general-
izations cast into such phrases as 'words which have this
general meaning are often encountered in these and similar
structures' have been replaced by the precise definition of
rules and the enumeration of complete sets of words defined
by a given property. Whereas once it was acceptable to say
(e.g., about Russian) that 'certain short forms which are
modals tend to govern a чтобы clause', now it is required
that: (a) the term 'modal' be defined, either by criteria
so precise that any modal could be easily identified, or if
that is not possible, by a list containing all of the modals
of the language, and (b) the 'certain short forms which are
modals' which actually do govern a чтобы clause be likewise
identified, either by precise criteria, or by a list.

Linguistic research into Russian has led to and will
continue to yield many discoveries about the language, and
the problem of recording and recalling the content of these
discoveries is not trivial. A system is required to
organize the information which has been ascertained, so
that this information can be conveniently retrieved when
it is required; such a system is realized as a lexicon.

Fillmore /3/ has defined a lexicon as follows:

> I conceive of a lexicon as a list of minimally
> redundant descriptions of the syntactic, semantic,
> and phonological properties of lexical items,
> accompanied by a system of redundancy rules, the
> latter conceivable as a set of instructions on
> how to interpret the lexical entries.

2. DESCRIPTION OF THE LEXICON

The steps in the construction of a lexicon may be detailed as follows:

a) deciding which words to enter, i.e., the lexical stock

b) deciding what are the subsets of the lexical stock

c) deciding what information to code about each subset

d) compiling the information

e) structuring the storage of the information

where the steps outlined have interdependencies. We shall discuss each of the steps, especially in relation to the Russian language.

a) The Lexical Stock

Ideally a Russian lexicon should contain all of the words in the Russian language, but 'all Russian words' is a set whose contents are not universally agreed upon, since some words are gradually dropped from usage, while others are continually being formed and added to the lexical stock. The words to be entered in the lexicon could be obtained from existing sources, i.e., lexicons and technical dictionaries, and be supplemented by neologisms found in written works. The lexicographer must also be alert for new meanings and contexts in which 'old' words may appear.

b) Subsets of the Lexical Stock

The lexical stock of Russian may be subdivided into word classes, i.e., words having certain properties in common. These properties may be morphological and/or functional. In Russian, nouns are not marked for tense and predicatives

are not marked for the property of animateness; hence they
are in different word classes. The subsets may coincide
with those of traditional grammar, or they may be different
if the grammar to which the lexicographer refers is not the
traditional one.

c) Information to be Coded

The choice of information to be coded in a particular
lexicon is a function of its intended use--in other words,
one should code the information that will be necessary for a
particular purpose or set of purposes, or information that
has a forseeable application. For example, one of the tasks
for the Wayne State University Machine Translation group was
to program a routine to group each nominal in a Russian sen-
tence with its preceding (dependent) modifiers. This pro-
cedure, called blocking, requires that the computer-stored
lexicon contain 1) word class information for identifying
nominals and modifiers, as well as conjunctions, punctuation,
and adverbs intervening between the modifiers, and other
word classes, tokens of which mark the boundaries of a
block; and 2) case, number, and gender information for esta-
blishing an agreement relation between the nominal and the
preceding modifiers.

Most existing Russian lexicons contain the usual morpho-
logical information for members of inflected word classes:
person, gender, number, case, animation, paradigm, aspect,
etc.. Certain syntactic information such as impersonality

and government of cases, prepositions, the infinitive, and clauses, is indicated for verbal word classes. This indication may be explicit or sometimes only implicit in an example; it is not consistent. It is not unusual to chance upon one of the complements of a certain predicative under the entry head of another predicative for which the example is given. In the Academy of Sciences dictionary /4/, the entry head нелепый contains the example Стало вдруг обидно и досадно, что приходится играть такую нелепую роль. In the same lexicon, under обидный, the form обидно is shown to govern a что clause in an example; however, under досада there is neither coding nor example to indicate that досадно takes a что clause.

Each lexical entry should include all of the existing phonological, morphological, and syntactic information about the head word; the discussion and presentation of this information will entail the introduction of concepts from semantics and stylistics. When using a Russian lexicon, one should be able to discover whether можно is a modal (if the grammar of Russian uses the concept 'modal' for the word class of which можно is a member) by looking under the entry head можно and finding the position where the property 'modal' is coded for that word. Furthermore, one should be able to determine whether можно takes an infinitive complement, whether it takes a subject, or whether it has a corresponding long form, etc..

Since the predicate is the sentence fulcrum, i.e., since

it contains the most information necessary for analysis of
the structure of the sentence, the coding of the complements
of predicative words is one of the main tasks for the data
input to automatic parsing of Russian sentences. Machine
translation oriented lexicographers have done a great deal
of work in coding the complements of many lexemes, especially
the predicatives, in an explicit and thorough way.

Iordanskaja /5/ suggested 126 different complementation
patterns to account for the "strong government" of 7000
Russian stems. She recognized that the meanings of the stems
could be associated with different patterns; e.g., следовать
has the following meanings with the following complements:

1) 'to go after' with за + instr.

2) 'to ensue'   with из + gen.

3) 'to be guided by something' with dative without prep.
She recommended that the stems with different meanings be
treated as different, and that a model be composed separately
for each item.

Rakhmankulova /6/ has written 12 models of complements
for sentences containing any of ten different German verbs
denoting position in space, and she illustrates, in a
matrix, which verbs can appear in which models.

Machine translation groups have examined Russian texts
and from them compiled lists of nominals and predicatives
which take an infinitive complement or a что or чтобы clause
complement, and lists of governing modifiers with their

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complementary structures, many of which are not shown in
any lexicon. The Wayne State University group has done
extensive coding of the complementation of predicatives
(verbs and short form modifiers), modifiers (participles
and adjectives which govern complementary structures),
and nouns. The group has created an auxiliary dictionary
which is structured so that every complementation pattern
(where the pattern includes an indication of the optional
presence or obligatory absence of a subject) associated
with each predicative in the dictionary is written out ex-
plicitly. For example, the entry for потребовать in this
auxiliary dictionary reads as follows:

PATTERN NUMBER	CAN SUBJECT (NOM. CASE) BE PRESENT?	NOMINAL 1 2 3	PREP+CASE 1 2	CLAUSE ЧТО ЧТОБЫ	INF.
1	yes	acc			
2	yes	gen			
3	yes	gen	к+dat		
4	yes	gen	до+gen		
5	yes	gen	с+gen		
6	yes			yes	
7	yes				yes

For translation purposes, it will be necessary to indicate
the translation(s) of the predicative corresponding to each
pattern, as well as those of the prepositions and case
endings in each pattern. A language example of pattern 3

is Уже около полудня его потребовали к околоточному. -'Already around midday they <u>summoned</u> him to the police.',
while pattern 4 is illustrated by От писателя мы потребуем
художественной правды. -'Of a writer we shall <u>require</u>
artistic truth.'.

The above entry may not be complete. For instance, it
does not show the entry y+gen which reflects a phrase in
Smirnitsky's dictionary /7/, требовать объяснения у кого - 'to
demand an explanation from somebody', which is not shown in
three Russian lexicons /8/. Furthermore, it can be seen
that the patterns with к+dat can be extended so that that
phrase is replaced by в+acc or even by an adverbial домой
-'home'. New information will always be added.

One transformationalist technique is to specify a syn-
tactic construction along with a list of (all of the) lexemes
which can occur in a certain position of that construction.
The set of lexemes which can be tokens in a certain position
of a construction is the domain of that construction with
respect to the position. Once a lexeme is in that domain,
the pair consisting of the position and the construction
becomes part of the definition of that lexeme. The lexeme
is completely defined by all of the pairs in which it is a
token, and ideally the contents of a lexical entry would in-
clude all such pairs.

Fillmore /9/ has compiled a list of English verbs which
take a to-phrase complement, i.e. lexemes which occur in the

position VERB of the construction SUBJ + VERB + to-phrase.
He is careful to point out that the to-phrase must function
as the complement of the verbs on the list (e.g., agree,
endeavor, hope, want) and not as a purposive adverbial phrase
(as with 'wait' in 'He waited to see her.' where 'to' can
be replaced by 'in order to'), since as he states,"The
appearance of purpose adverbial to-phrases... does not
appear to be statable in terms of contextual verb type."/10/
This indicates that the formal construction is not always
sufficient to define a property, and that the deep structure
function of the construction may have to be specified as
well.

The fact that statements which are formally identical
can have distinct deep structures is illustrated by the
following Russian language examples, which are not only
formally identical, but identical in content except for one
word:

>Пять человек было выбрано нами.
>Five persons were elected by us.

>Пять человек было выбрано делегатами.
>Five persons were elected as delegates/by the delegates.

>Пять человек было выбрано референдумом.
>Five persons were elected by referendum.

In the first example, the (pro)noun in the instrumental
case is the subject of the active transform

>Мы выбрали пять человек.
>We elected five persons.

while in the second example, first interpretation, the in-

strumental noun remains in the instrumental case in the active transform, where (X) stands for some subject:

(X) выбрали пять человек делегатами.
(X) elected five people as delegates.

The instrumental noun in the third sentence also remains in the instrumental case in the active transform, but is shown to have a different function from the noun in the second sentence by the fact that it is possible, albeit not elegant, to say

Пять человек было выбрано делегатами референдумом.
Five people were elected as delegates by referendum.

and correspondingly

(X) выбрали пять человек делегатами референдумом.
(X) elected five people as delegates by referendum.,

i.e. both words can coexist in a sentence.

Kiefer / 11 / has shown for Hungarian that the meaning of the verb can change within a given construction when the definition of the construction is formal and does not consider semantic properties of the components.

Penz van nála.
He has money on him.

is contrasted with

Péter van nála.
Peter is with him.

where the animate status of the subject distinguishes the possessive and locational meanings.

Lehiste /12/ has shown that the distinction between 'being' and 'having' in Estonian is one of different complements taken, under special conditions, by the same verb.

Although

> Isal on raamat.
> Father has (a) book.

and

> Laual on raamat.
> On the table is (a) book.

are structurally identical, since morphologically _isal_ and
laual are both in the adessive case and _raamat_ is in the
nominative case, when functional (semantic) case names
are used, _isal_ is dative and _laual_ is locative, while
raamat is in both sentences in the objective case.

As researchers work in the area of discovering and
codifying syntactic properties, they find out that semantic
considerations are impossible to avoid. Much of the new
work in lexicology involves the analysis of predicates and
their arguments (i.e., subjects, and complements such as
clauses, noun/adjective phrases, and prepositional phrases).
The transition from purely syntactic coding (i.e., specifying
the complements and their morphological cases if applicable)
to semantic coding has been made by Fillmore /13/ with his
grammatical cases (e.g., agent, instrument, object).

d) Compiling the Information

Compiling a dictionary entails discovering facts about
a language and arranging these facts in such a way that they
may be conveniently retrieved. The key factor is that once
a statement is made about a certain member of a word class,
all the other menbers of that class must be coded for the
way that statement applies to them. If the statement is

irrelevant for certain members, it may be desirable to create
a new word class for the latter.

A lexicon without lacunae can be compiled by the following
procedure: For each word class construct a matrix such that
each column head is a bit of information pertinent to this
class, and the row heads are all of the words in this class.
Each intersection must be filled with some code indicating
whether or not the word has the property, and the codes of
the properties must be such that they allow the entire spec-
trum of possible answers. For example, since the Russian
сирота - 'orphan' - can be feminine or masculine, the gender
code must include also combinations of the basic components
(masculine, feminine, and neuter); since the Russian
дифференцировать -' to differentiate' - is both perfective
and imperfective, the code for aspect must comprise entries
for 'perfective', 'imperfective', and 'both'. When a verb
is marked 'both', it may be desirable to specify the dis-
tribution of the aspects over meaning and/or tenses.

This matrix format forces the lexicographer to commit
himself about the way each property applies to each member
of the word class. It precludes the old-fashioned quasi-
coding, where the lexicographer coded what he knew and
omitted what he did not know or had never thought to con-
sider. In some Russian lexicons, certain nouns were coded for
having no plural, but the absence of this coding in other
entries did not necessarily imply that they did have a

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plural; the only inference that could be drawn was that
most nouns not coded for having no plural did indeed have
one, but this information is not meaningful when definite
information about a particular entry is required.

When using the matrix format, with its demands for con-
sistency, one faces the problem of how to get the information
to fill its intersections. Naturally, if the information
is already in a dictionary, or if the lexicographer has an
example, from some text, of the phenomenon to be coded, there
is no problem in filling the intersection. However, if the
example is lacking, this is not always sufficient ground for
coding the non-existence of the property. Sometimes, de-
spite the absence of an example, the lexicographer feels that
the property holds, and he may consult with a native informant,
using the caution offered by Zellig Harris /14/:

> If the linguist has in his corpus ax, bx, but
> not cx (where a, b, c are elements with general
> distributional similarity), he may wish to check
> with the informant as to whether cx occurs at all.
> The eliciting of forms from an informant has to
> be planned with care because of suggestibility
> in certain interpersonal and intercultural re-
> lations and because it may not always be possible
> for the informant to say whether a form which
> is proposed by the linguist occurs in his language.
> Rather than constructing a form cx and asking
> the informant 'Do you say cx?' or the like, the
> linguist can in most cases ask questions which
> should lead the informant to use cx if the form
> occurs in the informant's speech. At its most
> innocent, eliciting consists of devising situa-
> tions in which the form in question is likely
> to occur in the informant's speech.

Work at Wayne State University on the complementation
of certain Russian -o forms by что/чтобы clauses /15/ sup-

ports Harris' observation. The difficulties of working with
a native informant became evident when, on different occasions
the native accepted and then rejected certain constructions.
Sometimes the acceptance depended on the construction of
contexts which eluded the native on the second perusal.

The matrix approach is currently being used in Russian
lexicon research at Wayne State University, where the inform-
ation in the Academy dictionary /16/ and in Ushakov /17/
is being coded.* The omissions and inconsistencies of
presenting lexical information in the lexicons are discussed
in a paper by Alexander Vitek /18/. Grammatical profiles
have been produced for all Russian substantives, adjectives,
and verbs, including their derivative participles and
gerunds. The profiles contain primarily morphological
properties, but some syntactic coding, mainly of comple-
mentation patterns, has also been started.

A sample of the coding format developed for Russian verbs
(in Ushakov) in this research appears in Figures 1 and 2.

In Figure 1, the coding form for Russian verb morpho-
logy, separate fields are denoted by a single slash mark.
Each field has codes for certain morphological properties
of the Russian verb. The following chart explains the codes
for the verb добыть - 'to obtain', which appears on the first
line of Figure 1.

ID #	RUSSIAN FORM	SUBSET Based on final graphemic clusters
21072913	ЛОБЫ/ТЬ *	11107 / 0210 11 1200
21075020	ЛОКРЫ/ТЬ	11107 0210 12 200 0000 13 0000 00 00 000 001
21076424	ЛОМЫ/ТЬ	11107 0210 12 200 0001 13 0000 00 00 000 001
21076919	ЛОПЛЫ/ТЬ	11107 0210 11 100 0000 02 0000 00 00 300 001
21077619	ЛОРЫ/ТЬ	11107 0210 12 200 0001 3 0000 00 00 000 001
21089417	ЗАБЫ/ТЬ	11107 0210 11 200 0000 99 0000 0 00 000 001
21090807	ЗАВЫ/ТЬ	11107 0200 12 200 0000 13 0000 00 00 000 001
21096201	ЗАКРЫ/ТЬ	11107 0210 12 200 0000 13 0000 00 00 000 001
21098811	ЗАНЫ/ТЬ	11107 0210 12 200 0000 13 0000 00 00 000 001
21099304	ЗАНЫ/ТЬ	11107 0200 12 200 0001 13 0000 00 00 000 001
21100522	ЗАПЛЫ/ТЬ	11107 0210 11 100 0000 3 0000 00 00 300 001

Figure 1. RUSSIAN VERB MORPHOLOGY CODING FORMAT

* A slash mark indicates stress.

Morphology Code for ДОБЫТЬ

Field	Code	Meaning
1	0210	Perfective aspect in all meanings; there exists a single counterpart verb (i.e., of imperfective aspect); subaspect (i.e., iterative/non-iterative) does not apply.
2	11	First conjugation verb: 1st person singular ends in -y; 3rd person plural ends in -ут.
3	200	Stress is fixed on the stem throughout the conjugation; there are no alternate stress patterns.
4	0000	No changes occur in the stem in the present tense conjugation.
5	99	LIST TYPE: -ть is dropped, and бы- is replaced by буд-.
6	0000	There are no consonantal mutations.
7	00	There are no restrictions in usage of present and future tense.
8	00	Regular past tense marker: drop -ть and add -л to stem.
9	7000	Stress is on stem in all past tense forms except the feminine where it is on the ending.
10	00	There are no restrictions in usage of past tense.

In Figure 2, the coding form for Russian verb government, separate fields are denoted by double slash marks, with single slash marks used for separation within a given field. The codes are explained once again with the verb добыть - 'to obtain', which appears on the first coding line.

The remainder of this format is reserved for SPECIFIC GOVERNMENT INFORMATION which varies in content and length according to each entry; in addition, for those entries which show a cross-reference in the dictionary, the government code is followed immediately by the code "R1".

AN-11   SUBSET 1110?

ID #	RUSSIAN FORM
210729130000	AOБЫ/ТЬ
210750200000	AOKPЫ/ТЬ
210764240000	AOMЫ/ТЬ
210769190000	AOПЛЫ/ТЬ
210776190000	AOPЫ/ТЬ
210894170000	ЗAБЫ/ТЬ
210903070000	ЗAБЫ/ТЬ
210962010000	ЗAKPЫ/ТЬ
210988110000	ЗAMЫ/ТЬ
210993040000	ЗAHЫ/ТЬ
211005220000	ЗAПЛЫ/ТЬ
211005230000	ЗAПЛЫ/ТЬ

* A slash mark indicates stress.

Figure 2.   RUSSIAN VERB GOVERNMENT CODING FORMAT

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Government Code for ДОБЫТЬ

Field	Code	Meaning
1	O2110	This entry has two Arabic numeral divisions in the lexicon; a general government marker precedes the first Arabic numeral; there are language examples given in the lexicon; the entry is not a -ся verb.
2	AA	The general government marker indicated above is the accusative case - кого/что.
3	OO	There is no government indicated under Arabic numeral #1.
4	OO	There is no government indicated under Arabic numeral #2.
5	Rl	The entry contains a cross-reference to some other verb.

e) Structuring the Storage of the Information

There are many ways of storing the words of a language. With respect to sequencing, alphabetical order is the most popular method, although reverse dictionaries exist, and dictionaries where words are sequenced by their length and only alphabetized within a given word length, or where word class is the primary division, are conceivable. With respect to the entry heads, they can be stems, canonical forms, or all of the forms that exist in the language. Note that a canonical form could be a particular form of a paradigm such as the masculine singular form of an adjective or the infinitive form of a verb, or it could be a certain verb from which other verbs are derived by certain rules. Binnick /19/ has illustrated the latter by suggesting that be could be an entry head having, as part of its contents, put and

make which are the causative forms of the locational and existential meanings, respectively, of be. Fillmore /20/ has mentioned that strike and touch differ primarily only in relative intensity of impact. It is interesting to note that Hebrew has for some verbs a basic form which is conjugated through seven 'constructions', two of which are labeled 'causative' and 'intensive'.

A lexicon whose entry heads are stems or canonical forms has the advantage of compactness and the advantage that the whole paradigm associated with these forms is indicated. It has the disadvantage that the user must know the rules of derivation in order to look up words which are not in canonical form. If every form in the language is an entry head, then the lexicon is much longer, but the homographic properties of the word are conveniently recorded; one might never realize, using a canonical for lexicon, that сел is both the past tense of сесть - 'to sit down' - and the genitive plural of село - 'village' -, but this property would be immediately evident if сел were an entry head.

In the Wayne State University machine translation research, Russian text to be translated or analyzed is 'read in' one sentence at a time; starting from left to right, segments of the sentence are 'looked up' in order to obtain whatever information about them has been stored in the machine translation lexicon. The minimum segment is one word; the maximum segment is an entire sentence; no segment is termi-

nated inside a word. The entry heads of the lexicon were
designed to correspond to the segments, and therefore are
words or sequences of words (idioms). The entry heads could
be canonical forms or stems, but this would require automatic
procedures for transforming any inflected form into its
canonical form, and for finding the stem of any form in text.
Space can be saved in a full form lexicon by entering only
once, perhaps under the canonical form, the information
which all members of a paradigm share, and cross referencing
this information under the related entry heads. In the
Wayne State University machine translation research, sets
of complementation patterns are stored in an auxiliary
dictionary and any set can be referenced by any verbal form.

The sequence of entry heads in the lexicon is alphabetical,
since the shape of the text word to be looked up is its only
identification. Naturally, if the set of Russian words could
be put into a one-to-one correspondence with some subset of
the positive integers by a function whose value on any word
in its domain could be determined only by information de-
ducible from the graphemic structure of that word, then the
entry heads of the lexicon would not have to be in alphabetic
order; in this case, the lookup would be simpler and faster,
since the entries could be randomly accessed.

The number of columns in the matrix of any word class
should be without limit so that new information can be en-
tered. Similarly, the number of rows should be without

limit to allow additions as the lexical stock of the language grows.

3. CONCLUSION

Lexical information is the consummation and thereby also the obviation of research through grammars and articles which discuss certain questions and present a few examples of lexical items which have certain properties. A lexicon must reflect the grammatical system used to describe the language, and it should carry the system through to every lexical item in the language. It is clear that the matrix format is the only one which will insure consistency and completeness. This format is eminently machinable and thereby convenient for the retrieval of lists of all words in the language which have a certain property.

REFERENCES

/1/ Uriel Weinreich, "Lexicology", Current Trends in Linguistics: Vol. 1, Soviet and East European, University of Indiana Press, Bloomington, Indiana, 1963.

/2/ Ibid., p. 61.

/3/ Charles J. Fillmore, "Lexical Entries for Verbs", Working Papers in Linguistics, No. 2, Computer and Information Science Research Center, The Ohio State University, Columbus, Ohio, November 1968, pp. 23-24.

/4/ СЛОВАРЬ СОВРЕМЕННОГО РУССКОГО ЛИТЕРАТУРНОГО ЯЗЫКА (Dictionary of the Contemporary Russian Literary Language), Academy of Sciences, Moscow-Leningrad, 17 volumes, 1963.

/5/ Л.Н. ИОРДАНСКАЯ, ДВА ОПЕРАТОРА ОБРАБОТКИ СЛОВО-СОЧЕТАНИЙ С "СИЛЬНЫМ УПРАВЛЕНИЕМ", АКАДЕМИЯ НАУК СССР, ИНСТИТУТ ЯЗЫКОЗНАНИЯ, МОСКВА, 1961.

/6/ И.С. РАХМАНКУЛОВА, "О МОДЕЛЯХ ПРЕДЛОЖЕНИЙ ОБРАЗУЕМЫХ ОДНОЙ СЕМАНТИЧЕСКОЙ ГРУППОЙ ГЛАГОЛОВ", ИНОСТРАННЫЕ ЯЗЫКИ В ШКОЛЕ, No. 6, 1968.

/7/ A.I. Smirnitsky, Russian-English Dictionary, 6th ed. (New York: E.P. Dutton & Co., Inc., 1959).

/8/ Academy dictionary, Op. cit., Footnote 4, and also:

СЛОВАРЬ РУССКОГО ЯЗЫКА (Dictionary of the Russian Language), Academy of Sciences, Moscow, 4 volumes, 1957-1961.

D.N. Ushakov, ТОЛКОВЫЙ СЛОВАРЬ РУССКОГО ЯЗЫКА (Lexicon of the Russian Language), Moscow, 4 volumes, 1935-1940.

/9/ Charles J. Fillmore, "Desentential Complement Verbs in English", Project on Linguistic Analysis, Report No. 7, The Ohio State University, Columbus, Ohio, pp. 88-105.

/10/ Ibid., p. 94.

/11/ Ferenc Kiefer, "On the Structure of Lexicon", Interim Report No. 7, Research Group for Quantitative Linguistics, KVAL, Stockholm, February 1968, p. 5.

/12/ Ilse Lehiste, "'Being' and 'Having' in Estonian", Working Papers in Linguistics, No. 2, Computer and Information Science Research Center, The Ohio State University, Columbus, Ohio, November 1968, pp. 104-128.

/13/ Charles J. Fillmore, "Toward a Modern Theory of Case",
    RF Project 1685-6, The Ohio State University Research
    Foundation, Columbus, Ohio, August 1966.

/14/ Zellig S. Harris, Structural Linguistics, University of
    Chicago Press, Chicago, Illinois, 1951, p. 12.

/15/ Amelia J. Steiger and Sidney Simon, Observations on the
    Complementation of Some -O Forms by ЧТО/ЧТОБЫ Clauses,
    Wayne State University, Detroit, Michigan, 1968.

/16/ 4 volume Academy Dictionary, Op. cit. in Footnote 8.

/17/ Op. cit., Footnote 8.

/18/ Alexander Vitek, "Grammar and Lexicons: The Word Class
    of Adverbs in Russian Lexicons", Cahiers de Lexicologie,
    Didier-Larousse, Paris, Vol. 12, 1968-I.

/19/ Robert I. Binnick, "The Characterization of Abstract
    Lexical Entries", paper presented at the Sixth Annual
    Meeting of the Association for Machine Translation
    and Computational Linguistics, University of Illinois,
    Urbana, Illinois, July 24-25, 1968.

/20/ Op. cit., Footnote 3, p. 13.