THE SECOND IN A SERIES OF REPORTS ON CONTEMPORARY
STANDARD RUSSIAN MORPHOLOGY, THIS STUDY INVESTIGATES THE
FORMAL DEVICES OF WORD-FORMATION IN RUSSIAN. THERE ARE
APPARENTLY TWO TYPES OF VOWEL-ZERO ALTERNATION IN THE RUSSIAN
DERIVATIONAL SYSTEM--THE FIRST BEING A MORPHOPHONEME ON THE
FLEXIONAL LEVEL, AND THE SECOND IN THE DERIVATIONAL BASE OR
DERIVED WORD. THE BEHAVIOR OF THE VOWEL-ZERO MORPHOPHONEME IN
BOTH THE FLEXIONAL AND DERIVATIONAL SYSTEMS IS THE FOCAL
POINT OF THIS REPORT. (FB)

MEMORANDUM
RM-5223-PR
MAY 1967

STUDIES IN RUSSIAN MORPHOLOGY: II. VOWEL-ZERO ALTERNATIONS IN DERIVATION

D. S. Worth

PREPARED FOR:

UNITED STATES AIR FORCE PROJECT RAND

The RAND *Corporation*
SANTA MONICA • CALIFORNIA

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PREFACE

This Memorandum continues a series of studies of the derivational morphology of contemporary standard Russian. The first in this series is D. S. Worth, <u>Studies in Russian Morphology—I. The Suffix "-aga"</u>, RM-3235-PR, August 1962. These studies are being made to add to our understanding of the formal devices by which words are formed in Russian, and ultimately to contribute to automatic analysis and synthesis of this language. By making use of an automatically segmented morpheme dictionary, the present Memorandum analyzes vowel-zero alternations in derivation.

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SUMMARY

This Memorandum analyzes the vowel-zero alternations
of contemporary standard Russian, with emphasis on those
alternations that are specific to the derivational (as op-
posed to the flexional) system. A brief introduction
sketches the theoretical generative framework within which
the specific techniques of word-formation are considered,
and provides a condensed survey of flexional vowel-zero
alternations as a contrasting background to the bulk of
the Memorandum.

It is shown that there are two types of vowel-zero
alternation in the Russian derivational system. In the
first type, a flexional-level vowel-zero morphophoneme
($\{\#\}$) is stabilized as either a full vowel or as zero in
the course of derivation. In the second type, a full vowel
in the derivational base alternates with zero in the de-
rived word, or vice versa. The existence of a vowel-
zero morphophoneme on the derivational level ($\{\%\}$) is sug-
gested as an explanation for certain of these alternations.

CONTENTS

STUDIES IN RUSSIAN MORPHOLOGY:
II. VOWEL—ZERO ALTERNATIONS IN DERIVATION

1. INTRODUCTION

Languages that join an elaborate flexional apparatus
to a complicated system of word—formation — as is the case
in the majority of Slavic languages — can be described
only with the aid of a complex set of morphophonemic enti—
ties. These entities are of two basic types: items (stems,
affixes, boundaries) and processes (rules for concatenating
items and for describing the phonetic consequences of such
concatenation). The exact border between these two types
of entity is by no means clear: certain kinds of informa—
tion can be included in either the item or the process part
of the morphological description (e.g., the palatalization
of paired consonants before {e} can be included in the des—
cription of Russian stems, or it can be left to the morpho—
phonemic rules of the flexional system). This is not the
place to discuss the appropriate balance between the speci—
ficity of the information contained in the item descriptions
versus that of the process rules (complexity in one part of
the morphological description standing in inverse proportion
to that in the other part). Rather, we shall examine in
some detail one specific morphophonemic entity of contem—
porary standard Russian (CSR), namely the alternating vowel—
zero morphophoneme, and attempt to point out some of the
differences in the behavior of this entity in the flexional

and the derivational systems respectively. The present paper, which is a preliminary report on one aspect of derivational morphophonemics, is intended to be suggestive rather than exhaustive.

2. FORMAL CONVENTIONS

Throughout this paper, morphophonemic transcriptions are given in curved brackets {}, phonemic transcriptions in slants //, and phonetic transcriptions in square brackets []. Phonemic transcription is used without regard to the question of whether a separate phonemic level exists, as a convenient device for indicating more phonetic detail than can be shown in the morphophonemic transcription, but where full phonetic specification would be irrelevant to the point under discussion. The phonetic transcription used here is that of R. I. Avanesov,[1] with the exception of the reduced mid central vowel, rendered here by [ə]. The morphophonemic transcription is moderately but not optimally "broad": on the one hand, it is broad in not marking the predictable palatalization of paired consonants before {e} or the stress-conditioned reductions of non-diffuse vowels, but on the other hand it uses only the relatively "narrow" alphabetic system, which cannot represent such generalized morphophonemes as the alternating {e ~ o} in

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[1]Avanesov, R. I., Fonetika sovremennogo russkogo literaturnogo jazyka, Moscow, 1956; Avanesov's symbols are transliterated in the usual manner.

identical environments (cf. вёл ~ ве́дший) as a single en-
tity — such representation being possible only with a
distinctive feature notation (+ vocalic, — consonantal,
— diffuse, — compact). In other words, the morphophonemic
transcription used in this paper is a compromise between
accuracy and readability; however, the simplifications
involved are not relevant to the problems with which the
paper is concerned.

The symbols used throughout this paper will be given
here, although their full significance and the interrela-
tions among them will in some cases become evident only in
the course of the subsequent exposition.

{#} is the alternating vowel-zero morphophoneme of the
flexional system, as in день, genitive дня, stem {d'#n'} or
окно́, genitive plural о́кон, stem {ok#n}.

[ø] is the phonetically (and /ø/ the phonemically)
zero alternant of morphophonemic {#}, appearing where it
is necessary for clarity's sake to mark this zero alter-
nant explicitly; otherwise, phonemic and phonetic zero are
shown by the absence of a symbol (the genitive singular of
день thus appearing as /d'øn'á/, [d'øn'á] or simply
[d'n'á]).

{%} and {ø} are morphophonemic symbols not in general
use; they are introduced in this paper to render the alter-
nating vowel-zero morphophoneme of the derivational system
({%}), as distinguished from the flexional {#}, with {ø}

representing the zero flexional-level alternant of deriva-
tional {%}, as in derivational {IG%R} from which are gen-
erated the flexional stems {igØr} of игра́, genitive plural
игр 'game' and {igór#k} of the diminutive игóрка, genitive
plural игóрок; like [ф], {Ø} is used only where clarity
requires explicitness. (Elsewhere, this symbol is simply
omitted, e.g. {igr}.)

Stems in the derivational system are given in capital
letters, those of the flexional system in lower-case letters.
The boundary between stem and affix is marked by a plus
(+), that between stem (simple or complex) and ending by
the hyphen (-). The tilde (~) means 'alternating with'.
The arrow (→) indicates that the entity to the right there-
of is generated from that to the left; arrows with super-
scripts $\overset{D}{\rightarrow}$ and $\overset{F}{\rightarrow}$ indicate that the rules of generation be-
long to the derivational and flexional systems respectively,
e.g., {B%REG} $\overset{D}{\rightarrow}$ {béreg} $\overset{F}{\rightarrow}$ [b'ér'ьk] in the nominative singu-
lar of бéрег 'bank'. Stress will be marked on non-monosyl-
lables as a matter of convenience, but the stress markings
have no systematic import.

Further conventions will be introduced and explained
as required below.

3. THEORETICAL FRAMEWORK

There is no need here to recapitulate the views of the
many scholars who have discussed the interrelations of the

derivational and flexional systems.[2] Instead, we shall
summarize the theoretical framework, discussed in more de-
tail elsewhere,[3] which serves as background for all the
remarks made in this paper. This theoretical framework
itself has been advanced only tentatively, as a basis for
discussion, and may well stand in need of revision; how-
ever, such revision is unlikely to affect the description
of the vowel-zero morphophonemes with which this paper is
concerned.

The morphological system of Russian consists of two
hierarchically ordered subsystems, derivational and flex-
ional. Derivation is anterior (in the synchronic sense)
to flexion, since the stems of the flexional system are to
a large extent the result of items and processes on the
derivational level. The output of the derivational system
serves as the input to the flexional system:

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[2]See, for example, V. V. Vinogradov, "Slovoobra-
zovanie v ego otnošenii k grammatike i leksikologii,"
Voprosy teorii i istorii jazyka v svete trudov I. V.
Stalina po jazykoznaniju, Moscow, 1952, pp. 99–152; A. V.
Isačenko, "O vzájomnych vzt'ahoch medzi morfológiou a
deriváciou," Jazykovedný časopis (Bratislava), 7, 1953,
pp. 200–213; E. Stankiewicz, "The Interrelation of Para-
digmatic and Derivational Patterns," Word, 18, 1962,
pp. 1–22; and further bibliographical indications in these
works.

[3]"The Notion of "Stem" in Russian Flexion and Deri-
vation," to appear in the forthcoming Festschrift for
Roman Jakobson.

DERIVATIONAL SYSTEM	D →	FLEXIONAL SYSTEM	D →	PHONETIC RE- PRESENTATION
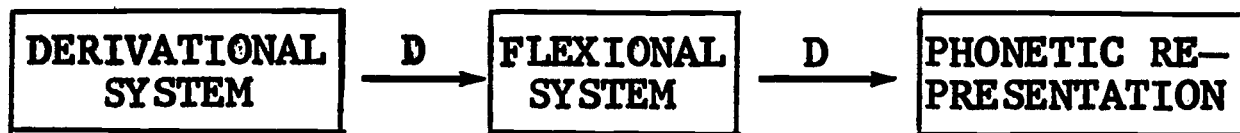
Since the entities of the flexional system are gener-
ated by concatenating items of the derivational system
(stems, affixes) with concomitant morphophonemic change
(truncation, substitutive softening, interfixation, etc),
it is clear that the "stems" of the two systems differ
considerably, e.g., the flexional stem {bereg}, which
serves to generate all the paradigmatic forms of the word
бéрег, [b'ér'ьk], [b'ér'ьgə], ..., [b'ьr'i^{e}gá], etc., can-
not serve to generate the derived words безбрéжный,
прибрéжный, etc. We assume as a postulate, therefore, that
every word has a derivational (D-) stem, adequate to gen-
erate both the word's flexional stem and the derivational
and flexional stems of all words derived from the given
word. The morphophonemic rules of the flexional system
(i.e., morphophonemics in the usual sense) serve to gener-
ate phonetic representations out of flexional (F-) stems.
The morphophonemic rules of the derivational system, which
are almost totally uninvestigated, serve two functions:
they generate flexional stems out of derivational stems,
and they generate derived (secondary) derivational stems
out of their primary bases (Russian производящая основа).
In somewhat simplified form, this theoretical framework
can be schematized as:

$$\{\text{D-STEM}\} \xrightarrow{\quad D \quad} \{\text{F-stem}\} \xrightarrow{\quad F \quad} \begin{bmatrix} \text{phonetic re-} \\ \text{presentation} \end{bmatrix}$$

$$\Big\downarrow D$$

$$\begin{Bmatrix} \text{DERIVED} \\ \text{D-STEM} \end{Bmatrix} \xrightarrow{\quad D \quad} \begin{Bmatrix} \text{Derived} \\ \text{F-stem} \end{Bmatrix} \xrightarrow{\quad F \quad} \begin{bmatrix} \text{phonetic re-} \\ \text{presentation} \end{bmatrix}$$
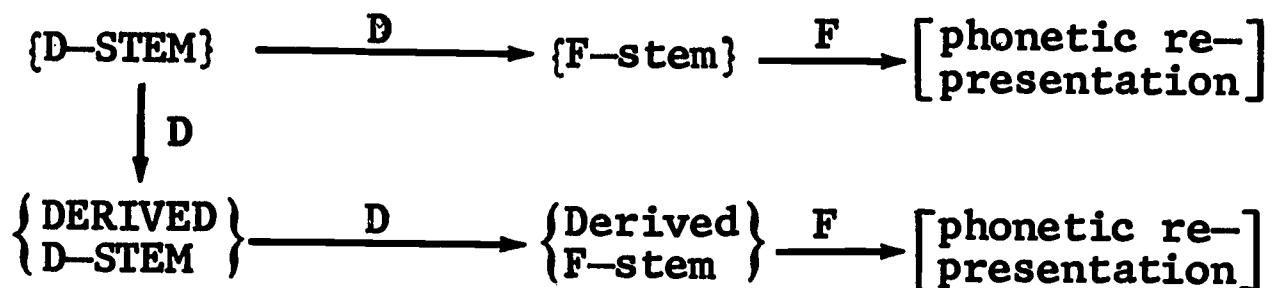
The D-stem of a word, as is clear from this schema, stands in a predictive relation both to its own F-stem (and ultimately to the latter's phonetic representation), and to the D-stems, F-stems and phonetic representations of all secondary, tertiary, etc., derivatives of the given word as well.

Against this background, it is clear that the flexional rules will have to generate either a full vowel (symbolized here by [v], without for the moment considering exactly which full vowels occur in which environments) or no vowel ([ϕ]) out of the flexional morphophoneme {#}, i.e.

$$\{\#\} \xrightarrow{\quad F \quad} \begin{cases} [v] \\ [\phi] \end{cases}$$

(without specifying the environments in which the one and the other choice must be made; cf. below). It is equally clear, moreover, that the flexional morphophoneme {#} itself must be generated by a rule of the derivational system out of some entity of the derivational stem, namely out of the derivational vowel~zero morphophoneme {%}. Flexional {#}, however, is but one of the three possible flexional morphophonemes resulting from derivational {%}, the other two being a full vowel (symbolized here by {V}, again

without considering exactly which full vowel obtains in
which environments), e.g., {IG%R} → {IGOR+} → {igór#k–},
and the absence of any vowel morphophoneme, namely {∅},
e.g., {B%REG} → {+BØREG+} → {bezbréž#n–}.[4] This subset
of the D–rules will thus have the form (again without
specifying environments):

$$\{\%\} \xrightarrow{\quad D \quad} \begin{cases} \{V\} \\ \{\emptyset\} \\ \{\#\} \end{cases}$$

With these general considerations in mind, we can
examine flexional {#} and derivational {%} in more detail,
in Secs. 4 and 5, respectively.

4. THE VOWEL~ZERO MORPHOPHONEME IN FLEXION: {#}

Although the facts concerning the distribution and
various phonetic realizations of the vowel~zero morpho–
phoneme in the flexional system of CSR are generally well
known, a brief recapitulation may not be out of place
here. Stems differ from endings, both in the specific
vowels that alternate with [ø] and in the environments
that condition the choice of [ø] or [v]. Nominal stems
generally show /ó/, /é/, or their unstressed reductions
(сон, genitive сна 'sleep'; день, genitive дня 'day'),

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[4] Such derivations are given only informally here;
the precise type and order of rules that will generate
flexional stems out of derivational stems have yet to be
worked out. The derived stem {bezbréž#n–} is formed by
concatenating {breg} (from {B%REG} with the discontinuous
affix {bez+...#n–}).

verb stems, these same two vowels (жечь, past tense mascu-
line жёг, first person singular present жгу 'burn') plus
/i/ in aspect formation (поджигáть imperfective 'set fire
to'); endings have principally /i/ in verbs (infinitives,
нестѝ 'carry', cf. прочéсть 'read through'; imperatives,
несѝ! 'carry!' cf. сядь! 'sit down!') but /o/, /u/, /a/
(all rare) in substantive endings (fem. instr. singular
водóй ~ водóю 'water', нóчью 'night'; instr. plur. вóдáми
but лошадьмѝ 'horses'). The choice of full vowel or zero
is determined partially phonetically, partially by paradigm
class or stylistically in endings,[5] but it is conditioned
almost exclusively by the phonetic environment in the case
of stems: morphemes containing {#} reduce it to [ø] before
morphemes the first or second segment of which is a full
vowel, but vocalize this {#} to a full vowel in all other
positions, i.e., before two consonants (подобрáть, present
подберý etc., 'pick up'), consonant plus {#} (infinitive
жечь 'burn' = {ž#g–t'#} → žeg–t' → [žéč]; past tense
{ž#g–1#} → žog–1 → [žók]), {#} plus consonant, i.e., a
non–vocalic segment, including {j} (plural дóнья of дно
'bottom' = {d#n+#j–} → dón+j–; instr. singular лóжью 'lie' =
{1#ž–#ju} → lóž–ju → [lóži̯u]), or {#} alone ({d'#n'–#} →
[d'én']).

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[5]A full description of such alternations can be
found in Harold L. Klagstad's unpublished dissertation
(Harvard University, 1954), Vowel–Zero Alternations in Con-
temporary Standard Russian.

It must be emphasized that the occurrence of vowel-
zero alternations is not automatic, that is, not predict-
able from the environment in which a stem occurs (the
realization of the vowel~zero morphophoneme as [v] or [∅],
on the other hand, is predictable), although the occurrence
of {#} is more nearly predictable in some form classes than
in others. In masculine substantives the occurrence of {#}
is completely unpredictable: стрелóк, стрелкá 'gunner'
({strel#k-}) versus игрóк, игрокá 'gambler' ({igrok-}),
both animate; платóк, платкá 'kerchief' ({plat#k-}) versus
челнóк, челнокá 'canoe' ({čolnok-}), both inanimate;
кáшель, кáшля 'cough' ({kás#l'-}) versus скóбель, скóбеля
'spokeshave' ({skóbel'-}); ремéнь, ремнá 'strap' ({rem'#n'-})
versus ячмéнь, ячменá 'barley' ({jačmen'-}); соловéй,
соловьá 'nightingale' ({solov'#j-}) versus дуралéй, дуралéя
'nincompoop' ({duraléj-}); наём, нáйма 'hiring' ({naj#m-})
versus поём, поёма 'meadow flooded in spring' ({pojóm-}).
The appearance of the "mobile vowel" — i.e., the existence
of morphophonemic {#} — is more nearly predictable in the
genitive plural of feminines and neuters, but not entirely
so: бóйня, genitive plural бóен 'slaughterhouse' ({bój#n'-})
versus обóйма, обóйм 'cartridge clip' ({obójm-}); тюрьмá,
тюрем 'prison' ({t'ur'#m-}) versus пáльма, пáльм 'palm
tree' ({pál'm-}); кýкла, кýкол 'doll' ({kúk#l-}) versus
иглá, игл 'needle' ({igl-}); судьбá, сýдеб 'fate'
({sud'#b-}) versus прóсьба, прóсьб 'request' ({prós'b-});

ядро́, я́дер 'kernel' ({jad'#r-}) versus (plural only) нѐдра,
нѐдр 'womb, bosom' ({nédr-}). In the short form masculine
of adjectives, the appearance of a mobile vowel is largely
but still not entirely predictable: бы́стрый, бы́стр 'swift'
({bístr-}) versus о́стрый, остёр (and о́стр) 'sharp'
({óst'#r-}); по́длый, подл 'vile' ({pódl-}) versus свѐтлый,
свѐтел 'light, clear' ({svét'#l-}). Since in many cases
the existence of morphophonemic {#} cannot be predicted
from its environment, internal consistency requires that it
be stated explicitly as part of the morphophonemic trans-
cription of every stem and ending in which it occurs.
Every such stem must therefore be derived from a D-stem by
the third of the three possible D-rules described above,
namely by the rule {%} $\overset{D}{\to}$ {#}, e.g., {KÁŠ%L'-} $\overset{D}{\to}$ {káš#l'-},
{KÚK%L-} $\overset{D}{\to}$ {kúk#l-}, etc.

5. THE VOWEL-ZERO MORPHOPHONEME IN DERIVATION: {%}

Whereas the vowel-zero alternations in Russian flexion
are fairly straightforward and systematic, at least in
stems, those of Russian derivation are a good deal more
complicated. Let us begin with a survey of the facts.

An examination of word families in terms of the vowel-
zero alternations occurring therein brings to light two
principal classes of alternation: (1) there are words in
which the vowel-zero alternation of the flexional stem of
the base is eliminated in the derivational process, {#}

being replaced either by a full vowel (type бу́лка, genitive plural бу́лок 'bun', diminutive бу́лочка) or by zero (type лёд, льда 'ice', derived adjective ледо́вый 'icy'); i.e., there are words in which we have the derivational alternations {#} ~ {V} and {#} ~ {∅} respectively; (2) in other word families, there are no vowel-zero alternations on the flexional level, but such alternations appear when one flexional stem is compared to another, a full vowel of the base corresponding to a zero in the derived form (type ме́бель, ме́бели 'furniture', меблирова́ть 'to furnish') or vice versa (type игра́, genitive plural игр 'game', diminutive иго́рка); i.e., in other word families one has the derivational alternation {V} ~ {∅} ({∅} ~ {V}). We shall examine these two classes of alternation in Secs. 5.1 and 5.2 below.

5.1. {#} ~ {V} and {#} ~ {∅} Alternations in Derivation

The rules for vocalization ({#} $\overset{D}{\to}$ {V}) and elimination ({#} $\overset{D}{\to}$ {∅}) of {#} in derivational bases are generally similar to those governing the behavior of {#} in flexion, but there are certain striking differences.

5.1.1. Alternations before consonants. Stems containing {#} vocalize it to a full vowel before suffixes beginning with a consonant (i.e., a -vocalic, + consonantal segment): баго́р, genitive багра́ ({bag#r-}) 'hook, gaff' $\overset{D}{\to}$ баго́рщик ({bagórš:ik-}) 'fisherman, etc., using a gaff'; ло́дка, genitive plural ло́док ({lód#k-}) 'boat' $\overset{D}{\to}$ ло́дочник

({lódošn'ik-}) 'boatsman'; ковёр, коврá ({kov'#r-}) 'car-
pet' $\overset{D}{\rightarrow}$ ковёрчик ({kov'órčik-}) 'little carpet', etc.
There do not appear to be any exceptions to this rule.

  5.1.2. Alternations before full vowels. Less stable
is the behavior of {#} before derivational suffixes con-
taining a full vowel (i.e., a +vocalic, — consonantal seg-
ment). Ordinarily, derivational stems containing {#} elim-
inate it before vocalic suffixes, but there are a number of
exceptions to this general rule. A look at several typical
suffixes makes this clear.

  The suffix {+ást(ij)}. One finds the expected elimi-
nation of {#} in ýгол, genitive углá ({ug#l-}) 'corner,
angle' $\overset{D}{\rightarrow}$ углáстый ({uglást-}) 'angular'; вихóр, вихрá
({v'ix#r-}) 'cowlick' $\overset{D}{\rightarrow}$ вихрáстый ({v'ixrást-}) 'with a
cowlick', etc., but a seemingly unmotivated vocalization of
{#} in лоб, лба ({l#b-}) 'forehead' $\overset{D}{\rightarrow}$ лобáстый ({lobást-})
'with a prominent forehead'; and кóрень, кóрня ({kór'#n'-})
'root' $\overset{D}{\rightarrow}$ коренáстый ({kor'enást-}) 'thickset, stumpy'. (On
the reasons for such anomalies, see below.)

  The suffix {+ik}. Derivational stems that contain a
full vowel in the first syllable and a {#} in the second,
eliminate the {#} as would be expected in derivation before
the (diminutive) vocalic suffix {-ik-}: козёл genitive
козлá ({koz'#l-}) 'goat' $\overset{D}{\rightarrow}$ кóзлик ({kózl'ik-}) 'small
goat'; and similarly орёл, орлá 'eagle' $\overset{D}{\rightarrow}$ óрлик; осёл,
ослá 'donkey' $\overset{D}{\rightarrow}$ óслик; хохóл, хохлá 'cowlick' $\overset{D}{\rightarrow}$ хóхлик;

чехо́л, чехла́ 'case' $\overset{D}{\rightarrow}$ чёхлик; ковёр, ковра́ 'carpet' $\overset{D}{\rightarrow}$
ко́врик; ломо́ть, ломтя́ 'round (of bread)' $\overset{D}{\rightarrow}$ ло́мтик 'slice'.
However, derivational stems that contain no full vowel, but
only {#} ("non-syllabic stems" in Jakobson's terminology[6])
vocalize this {#} even before the vocalic suffix {-ik-}:
лоб, лба 'forehead' $\overset{D}{\rightarrow}$ ло́бик; ров, рва 'ditch' $\overset{D}{\rightarrow}$ ро́вик; пёс,
пса 'dog' $\overset{D}{\rightarrow}$ пёсик; рот, рта 'mouth' $\overset{D}{\rightarrow}$ ро́тик.

The suffix {+ist(ij)}. The adjective-forming suffix
{-ist-} is more regular in its effect on the {#} of deriva-
tional bases than the diminutive {-ik-}.

The majority of derivational bases containing {#} elim-
inate it before {-ist-}: сте́бель, стёбля 'stem' $\overset{D}{\rightarrow}$
стеблѝстый 'many-stemmed'; ко́рень, ко́рня 'root' $\overset{D}{\rightarrow}$ корнѝстый;
ко́готь, ко́гтя 'claw' $\overset{D}{\rightarrow}$ когтѝстый; но́готь, но́гтя 'nail' $\overset{D}{\rightarrow}$
ногтѝстый; ручёй, ручья́ ({ruč#j-}) 'stream' $\overset{D}{\rightarrow}$ ручьѝстый
({ručjíst-}). Derivational bases containing only {#} do
not vocalize it before {-ist-}: лёд, льда 'ice' $\overset{D}{\rightarrow}$ льдѝстый;
пень, пня 'stump' $\overset{D}{\rightarrow}$ пнѝстый; мох, мха (and мо́ха) 'moss' $\overset{D}{\rightarrow}$
мшѝстый. Only ка́мень, ка́мня 'stone' and сту́день, сту́дня
'galantine' vocalize the {#} of their stems before this
suffix, giving каменѝстый and студенѝстый.

The suffixes {+iš#k-}, {+yš#k-}. Standard grammars,
such as that of the Soviet Academy, list two suffixes in
/išk/, a diminutive -yško and a scornful, ironic -iška

_____
[6]R. Jakobson, "Russian Conjugation," Word, 4, 1948,
pp. 155-167.

(from feminines and animate masculines) ~ -iško (from neu-
ters and inanimate masculines). These suffixes would re-
quire a separate study, since the existing descriptions do
not give an adequate picture of either their formal or
their semantic features (e.g., stem-final consonants of the
derivational bases are sometimes softened, sometimes not:
рот, рта ({r#t-}) 'mouth' gives the diminutive ротишко; but
дон, дна ({d#n-}) 'bottom' has the diminutive донышко). We
shall return to these suffixes elsewhere; for now let us
note only that {#} of the derivational base behaves most
erratically. Most of the -a declension derivatives show
{#} $\overset{D}{\rightarrow}$ {∅}, e.g., земля, genitive plural земель ({zem'#l'-})
'earth' $\overset{D}{\rightarrow}$ землишка (pejorative); парень, парня ({par'#n'-})
'lad' $\overset{D}{\rightarrow}$ парнишка; статья, genitive plural статей ({stat'#j-})
'article' $\overset{D}{\rightarrow}$ статьишка ({stat'jíš#k-}); судьба, genitive
plural судеб ({sud'#b-}) 'fate' $\overset{D}{\rightarrow}$ судьбишка; only the "non-
syllabic" лёд, льда ({l'#d-}) 'ice' vocalizes {#} in
ледышка 'piece of ice'. The -o declension derivatives are
less consistent: {#} is eliminated in the cases of письмо,
genitive plural писем ({p'is'#m-}) 'letter' $\overset{D}{\rightarrow}$ письмишко;
седло, сёдел ({s'od'#l-}) 'saddle' $\overset{D}{\rightarrow}$ сёдлышко; and the non-
syllabic лоб, лба ({l#b-}) 'forehead' $\overset{D}{\rightarrow}$ лбишко; but is vo-
calized in рот, рта ({r#t-}) 'mouth' $\overset{D}{\rightarrow}$ ротишко; дон, дна
({d#n-}) 'bottom' $\overset{D}{\rightarrow}$ донышко; and судно, genitive plural
судов 'boat' (with suppletive loss of {-#n-}, but cf. судно
genitive plural суден 'bedpan', obliging one to posit

{sud'#n--}) $\overset{D}{\rightarrow}$ судёнышко pejorative and diminutive 'boat';
finally, стекло́ genitive plural стёкол ({st'ok#l--}) 'glass'
has both стёклышко and стеко́лышко, the former having the
meaning both of a diminutive of 'glass' and of 'piece of
glass', the latter being rather dialectal and an affection-
ate diminutive.

The suffix {--ov(ój)}, {--ov(ij)}. The adjective-
forming suffix {--ov--} causes the {#} of derivational bases
to be eliminated everywhere where the base contains a full
vowel in addition to {#}, e.g., ого́нь, огня́ 'fire' $\overset{D}{\rightarrow}$
огнево́й; ко́рень, ко́рня 'root' $\overset{D}{\rightarrow}$ корнево́й; у́гол, угла́ 'cor-
ner' $\overset{D}{\rightarrow}$ углово́й; котёл, котла́ 'cauldron' $\overset{D}{\rightarrow}$ котло́вый; ковёр,
ковра́ 'carpet' $\overset{D}{\rightarrow}$ ковро́вый. Morphophonemic {#} of the base
is also eliminated in a few non--syllabic bases (лён, льна
'flax' $\overset{D}{\rightarrow}$ льно́вый; пёс, пса 'dog' $\overset{D}{\rightarrow}$ псо́вый), but it is more
frequently vocalized, as in лоб, лба 'forehead' $\overset{D}{\rightarrow}$ лобово́й
'frontal'; лёд, льда 'ice' $\overset{D}{\rightarrow}$ ледово́й (and ледо́вый); рот,
рта 'mouth' $\overset{D}{\rightarrow}$ ротово́й; мох, мха (and мо́ха) 'moss' $\overset{D}{\rightarrow}$ мохово́й.

The erratic behavior of {#} is apparent from the sam-
pling of suffixes just adduced. In some cases, of course,
the historical causes of the appearance of {V} where we
would expect {∅} from {#} are clear: an original full
vowel of the stem has been supplanted by the alternating
vowel--zero morphophoneme {#}: ка́мень, ка́мня is an innova-
tion from an older --n--stem (cf. OCS kamy, genitive kamene),
and one can assume that камени́стый was formed before

{e} > {#}; similarly, коренáстый was presumably formed be-
fore the full vowel (cf. OCS koren', genitive korene) had
become {#} in кóрень, кóрня. It is tempting to assume
that ледóвый (ледовóй), ледянóй, and лéдышка were formed
before Old Russian ледъ, леду had become лед, льда but
льдúна (льдúнка) and льдúстый after this change; however,
without a detailed historical study of derivation, such
speculation about relative chronology can have no more sci-
entific value than that about "morphological analogy" or
"leveling", the results of which appear equally capricious
(Russian швец, швецá, Ukrainian швец, шевцá, Polish szewc,
szewca, etc.). In any case, such explanations cannot ac-
count for forms like моховóй from мох, мха (мóха) < мъхъ
and ротовóй from рот, рта < ръть, and even if — as is
unlikely — such a neat historical explanation turned out
to cover all the above cases, there is no apparent way to
convert this historical knowledge into a morphophonemic
description of the modern language. We are left, then,
with such anomalous pairs as ротúшко and лóбшко, лобáстый
and углáстый, студенúстый and стеблúстый, ледóвый and
льнóвый, etc.

The only generalization (concerning the vocalization
vs. elimination of {#} in derivation) permitted by the
facts so far is that there is a tendency to vocalize non-
syllabic bases (i.e., to avoid the non-syllabic form of
stems containing {#}) in derivation. This tendency becomes

a law only before the suffix {-ik}, which requires that
the stress fall on the presuffixal syllable, whence ло́бик,
пёсик, ро́вик, ро́тик; otherwise, variation is the rule, cf.
лоба́стый but ло́бишко, корена́стый but корни́стый, ледо́вый and
лёдышка but льди́на and льди́стый, etc. Whereas we saw in
Sec. 5.1.1. that {#} invariably becomes {V} before a con-
sonantal suffix, Sec. 5.1.2. has now shown us that {#}
does not always become {∅} before a vocalic suffix. In
Sec. 5.1.3., we shall see what happens to {#} before suf-
fixes beginning with a segment that is neither consonantal
nor vocalic, namely {#}.

  5.1.3. Alternations before {#}. Stems containing
{#} as penultimate segment invariably vocalize this {#} to
a full vowel before suffix-initial {#}. Such sequences of
two vowel-zero morphophonemes (i.e., {#C+#}) occur occa-
sionally in the formation of adjectives in {#n} and fre-
quently in the formation of diminutives in {#k} (mascu-
lines in -ок and feminines in -ка). Examples of adjec-
tives: заку́ска ({zakús#k-}) 'appetizer' → заку́сочный
({zakúsoč#n-})[7]; убо́рка ({ubór#k-}) 'harvesting' →
убо́рочный ({ubóroč#n-}); литьё ({l'it#j-}) 'casting' →

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  [7]A narrow morphophonemic transcription of the flex-
ional stem of those adjectives that have no short forms
could do without {#}; however, rather than posit two deri-
vational suffixes, {#n} and {n}, it seems reasonable to
posit a single suffix {#n}; since, in the case of the full-
form-only adjectives, this sequence will never occur in the
environment {___-#}, the {#} of the suffix will never be
vocalized.

литейный ({l'itéj#n–}); семья ({sem#j–}) 'family' →

семейный ({seméj#n–}), etc. Incidentally, in the last two

examples it is clear that, contrary to the Academy grammar

(I, p. 344), there is nothing unusual about the formation

of adjectives in –n– from jot–stem substantives; preterminal

{#} is vocalized as in the case of all other sequences of

{#} in successive syllables. Examples of diminutive sub–

stantives; кусок ({kus#k–}) 'piece' → кусочек ({kusóč#k–});

угол ({ùg#l–}) 'corner' → уголок ({ugol#k–}); ручей

({ruč#j–}) 'stream' → ручеёк ({ručej#k–}); булка ({búl#k–})

'bun' → булочка ({búloč#k–}); льдинка ({l'd'ín#k–}) 'piece

of ice' → льдиночка ({l'd'ínoč#k–}); земля ({zem#l'–})

'earth' → земелька ({zemél'#k–}); etc.

Within the theoretical framework of this paper, all

such cases will be described in terms of a derivational

stem containing {%}, which will be rewritten as {#} in

forming the flexional stem of the base word ({BÚL%K–} $\overset{D}{\to}$

{búl#k–}) but as {V} in forming the derivational and flex–

ional stems of the derived word ({BÚL%K–} $\overset{D}{\to}$ {búlok+#k} $\overset{D}{\to}$

{búloč#k–} etc.).[8] There is, however, another and quite

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[8]There remain several unanswered questions concern–
ing the form and propriety of rules and resulting entities
between the derivational stem of the base word ({BÚL%K–})
and the flexional stem of the derived word ({búloč#k–});
in particular, it is questionable whether it is necessary
or desirable to posit the existence of derivational stems
of derived words, rather than generating the latter's flex–
ional stems directly out of the basic derivational stem.
The validity of the theoretical framework adopted in this
article cannot be judged until this and similar questions
have been answered.

interesting avenue of inquiry, which can be sketched briefly
here, in the form of an excursus on the cyclical application
of morphophonemic rules.

5.1.3.1. On cyclical rules in derivational morphopho-
nemics. The Slavic linguist, raised on the traditional ex-
planation of the so-called "fall of the jers" (reduced vow-
els being counted as "strong" or "weak", always beginning
from the final segment of a word, with no attention paid to
boundaries between stem and ending, much less to those be-
tween derivational base and affix; "strong" jers become full
vowels, and "weak" jers disappear) may be tempted to treat
sequences of {#...#} in modern Russian in a similar way,
since the vowel-zero alternations of modern Russian have
their origin in the loss and vocalization of the jers. That
such a treatment will result in spurious forms can be seen
with a simple example.

The diminutive бу́лочка, genitive plural бу́лочек, is
derived from бу́лка by adding the suffix {#k} (with palatal-
ization of stem-final {k} of the base). If the morpheme
boundary is removed after palatalization, one obtains a
stem with the form {búl#č#k-}; the forms of the nominative
singular and genitive plural respectively have the forms
{búl#č#ka} and {búl#č#k#}. Application of regressive
(right-to-left) rules of the sort usually and superficially
taken as an adequate explanation of the behavior of the jers
will result in nominative singular [búləčkə] (бу́лочка) but

genitive plural *[búlčьk] (*булчек). Since the vague ref—
erences to morphological analogy or generalization of stems,
which in diachronic linguistics, serve to cover up the fact
that certain supposed sound laws do not work very well, are
entirely out of place in a synchronic description, a dif—
ferent explanation is clearly called for. One possible so—
lution is to adopt cyclically applied rules of the sort
first proposed by M. Halle.[9] Such rules would have the
following form:

(1) {k} → {č} before {+#k}[10]

(2) {#} → {ø} in the environment: ___$\begin{bmatrix} - \text{voc} \\ + \text{cons} \end{bmatrix} \begin{matrix} + \\ - \end{matrix} \begin{bmatrix} + \text{voc} \\ - \text{cons} \end{bmatrix}$[11]

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[9]Morris Halle, "O pravilax russkogo sprjaženija"
(Predvaritel'noe soobščenie), American Contributions to the
Fifth International Congress of Slavists, I, Linguistic Con—
tributions, The Hague, 1963, pp. 113—132.

[10]This rule, which is not germane to the problem of
vowel—zero alternations, is given here only informally. In
a more general and precise form, covering the cases of {x} →
{š} and {g} → {ž}, it would look something like:

[+ low tonality] → [− low tonality] in the environment:

___ $\begin{matrix} - \text{voc} \\ + \text{cons} \end{matrix}$ +{#k}

and even here we shall not have accounted for the − → + con—
tinuant of {g} → {ž}, not to mention the problem of feature
specification of {#}.

[11]The notation in this rule is a bit clumsy since the
signs + and − between the consonant and the vowel refer to
boundaries, i.e., what this rule says is that {#} becomes
phonetic zero before a sequence of consonant plus boundary
(stem—affix boundary or stem—ending boundary) plus vowel.

(3) $\{\#\} \rightarrow \begin{bmatrix} + \text{ voc} \\ - \text{ cons} \end{bmatrix}$ in the environment: $\underline{\quad} \begin{bmatrix} - \text{ voc} \\ + \text{ cons} \end{bmatrix} \begin{matrix} + \\ - \end{matrix}$ [12]

If applied to the underlying strings in two cycles, first to the smaller construct extending up to the stem-ending boundary ($\{-\}$) and then to the entire string, these rules will generate all and only the actually occurring phonetic representations, as follows (certain details of boundary removal being omitted):

	Nominative Singular	Genitive Plural
First Cycle:	(búl#k+#k)–a	(búl#k+#k)–#
1:	(búl#č+#k)	(búl#č+#k)
2:	no change	no change
3:	(búloč+#k)	(búloč+#k)
Second Cycle:	búloč#k–a	búloč#k–#
1:	no change	no change
2:	búločøk–a	no change
3:	no change	búloček–#
i.e.,	булочка	булочек

These rules work equally well in the case of $\{\#\}$, which is buried more deeply in the constituent structure of a derived stem (or, to put it another way, which is further back in the derivational history of a derived word). From the word лёд, genitive льдá ($\{l'\#d-\}$) 'ice', Russian derives a singulative льдúна ($\{l'd'ín-\}$) 'block of ice', from which a diminutive льдúнка ($\{l'd'ín\#k-\}$), cf. genitive plural льдúнок)

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[12] It is necessary to specify that the change $\{\#\} \rightarrow$ [v] occurs only before the sequence consonant plus boundary in order to permit the first $\{\#\}$ of (búl#č+#k) to generate a vowel, while preventing the second $\{\#\}$ from doing so.

'piece of ice' is formed, the latter having a further di-
minutive льди́ночка, genitive plural льди́ночек ({l'd'ínoč#k-})
'little piece of ice'. The stem of this last word, then,
has the following constituent structure:

$$<[\,(1'\#d+ín)+\#k]+\#k>-$$

Application of rules (1) through (3) to the smallest con-
struct (1'#d+ín) will generate (1'd'ín);[13] reapplication
to the next larger construct [1'd'ín+#k] will generate
[1'd'ín#k-], to the next larger construct (1'd'ín#k+#k) →
(1'd'ínoč#k-), and reapplication to the maximum constructs
of the nominative singular and genitive plural, 1'd'ínoč#k-a
and 1'd'ínoč#k-#, will generate the correct phonetic repre-
sentations of льди́ночка and льди́ночек respectively. Fur-
thermore, the correct flexional stems of all words in the
derivational history of льди́ночка are also correctly gener-
ated by such rules. One is reminded of the saying that on-
togeny recapitulates phylogeny.

Since rules (2) and (3) are the same as those needed
to describe the behavior of {#} in flexion, they cause no
complication in the grammar by being used in the derivational

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[13]Actually, an additional rule will be required, to
account for the softening of the {d} of {l'#d-} to {d'} in
{l'd'ín-}, but this is irrelevant to the present exposition.
Furthermore, it is not clear whether it is more insightful
and economical to account for such softening by morphopho-
nemic rules, or — an alternative solution worthy of seri-
ous investigation — by positing two morphophonemes, {y}
and {i} (a solution that, incidentally, would in no wise
affect the phonemic status of phonetic [y] and [i], which
are clearly both equal to /i/). The author hopes to return
to this point in a future article.

system as well. However, the necessity of specifying the
cyclical order of application of these rules, and of mark-
ing the constituent structure of all derived stems, which
is an awkward matter in the case of words with discontinuous
constituents, e.g., поддо́нник 'dish under flower pots' from
the stem {d#n—} of дно, plural до́нья 'bottom' and the dis-
continuous affix {pod+...+n'ik—} — not to mention the case
of words like Причерномо́рье 'Black Sea littoral' from the
syntactic combination при Чёрном Мо́ре and the affix {#j—} —
introduces complications of a type that are not easy to
weigh against the advantages of the type of description
just outlined. Final evaluation of the usefulness of cyc-
lical rules in derivational morphophonemics will have to
await further investigation.

5.2. {V} ~ {∅} and {∅} ~ {V} Alternations in Derivation

In all the vowel—zero alternations discussed above, the
base form upon which the flexional or derivational rules
operated contained the morphophoneme {#}; the behavior of
this entity in derivation was quite similar to that in
flexion (although far from identical; cf. ло́бик, ро́тик for
the expected *лбик, *ртик). The flexional system has no
parallel for the type of alternation that we shall now ex-
amine, however.

Russian contains a good many word families manifesting
a type of vowel—zero alternation that as far as this author

knows has not been mentioned in the literature. This is a
set of derivationally related words in which one member of
the set contains a full vowel in its flexional stem (e.g.,
мébель, мébели 'furniture') but the other member contains
no vowel — i.e., the stem vowel of the derivational base
is "lost", as it were, in the process of derivation (cf.
меблировáть 'to furnish'). In other cases, the opposite
situation obtains: a flexional stem without a vowel ac-
quires one in the course of entering a derived stem, e.g.,
игрá, genitive plural игр 'game' → diminutive игópка, ad-
jective игópный, etc. Alternations of the first type
($\{V\} \rightarrow \{\emptyset\}$) appear to be completely idiosyncratic, but
those of the second type ($\{\emptyset\} \rightarrow \{V\}$) are largely predict-
able in terms of the morphophonemic structure of the suffix
with which they are combined. A sampling of each type will
be presented below.

5.2.1. $\{V\} \rightarrow \{\emptyset\}$ alternations. Alternations of this
type are due to the various time depths and source lan-
guages of borrowings, which of course does not simplify
their description in CSR. Examples of such alternations:
тáбель, genitive тáбеля 'table (of ranks, etc.)' ($\{$tábel'–$\}$) →
таблúца 'table, plate' ($\{$tabl'íc–$\}$); кáбель, кáбеля 'cable'
($\{$kábel'–$\}$) → каблогрáмма 'cablegram' ($\{$kablográmm–$\}$);
рáкель, рáкеля 'knife to scrape ink from typeface' ($\{$rákel'–$\}$) →
раклúст 'printing shop foreman' ($\{$rakl'íst–$\}$); скóбель,
скóбеля 'spokeshave' ($\{$skóbel'–$\}$) → скоблúть 'scrape, plane'

({skobl'í—}); мéбель, мéбели 'furniture' ({mébel'—}) →
меблировáть 'to furnish' ({mebl'irová—}); шáбер, шáбера
'plane' ({šáber—}) → шáбрить 'to plane' ({šábr'i—}). In
other, phonetically similar or even identical cases, the
vowel of the original stem is preserved in the derived
forms (this is especially true of derived verbs), e.g.,
модéль, модéли 'model' ({model'—}) → моделИ́ровать 'to model'
({model'írova—}), and similarly штáбель, штáбеля 'stack,
pile' → штабелИ́ровать; нИ́кель, нИ́келя 'nickel' →
никелировáть; картéль, картéли 'cartel' → картелИ́ровать, etc.
Words in both the alternating and non—alternating group do
not appear to be marked in any way phonetically, for example
by non—sharping of consonants before {e}. One must conclude
therefore that pairs like модéль → моделИ́ровать and мéбель →
меблировáть are already distinctively marked on the level of
the derivational stem, i.e., as

$$\{\text{MODÉL'}\} \xrightarrow{D} \{\text{modél'}-\}$$
$$\downarrow$$
$$\{\text{MODEL'}\} \xrightarrow{D} \{\text{model'írova}-\}$$

on the one hand and

$$\{\text{MÉB\%L'}\} \xrightarrow{D} \{\text{mébel'}-\}$$
$$\downarrow$$
$$\{\text{MEBØL}\} \xrightarrow{D} \{\text{mebl'irová}-\}$$

on the other. Similarly, the flexional stems of нИ́кель,
штáбель, картéль are derived from underlying stems that also
contain a full vowel ({E}), whereas тáбель, скóбель, шáбер,
although their flexional stems contain the full vowel {e}
just as do those of the first three words, must derive this

{e} not from a full vowel but from the derivational—level vowel∿zero morphophoneme {%}.

 5.2.2. {∅} → {V} alternations. Alternations of the second type, i.e., in which the base word contains no vowel in a terminal cluster, but where such a vowel appears in derived forms, are more nearly predictable on phonetic grounds. Such alternations are particularly frequent (rel—atively speaking; there are in general not very many such words) in words containing velar + liquid clusters, e.g.: with {gr}, игра́, genitive plural игр 'game' ({igr—}) → diminutive иго́рка ({igór#k—}); ве́нгр, —a 'Hungarian' ({véngr—}) → feminine венге́рка ({vengér#k—}) and adjective венге́рский; with {gl}, игла́, genitive plural игл ({igl—}) → diminutive иго́лка ({igól#k—}), adjective иго́льный; ке́гля, more often plural ке́гли, genitive ке́глей 'skittles' ({kégl'—}) → adjective ке́гельный ({kégel'#n—}); with {kr}, и́скра, genitive plural искр 'spark' ({ískr—}) → diminutive и́скорка ({ískor#k—}); ша́нкр, —a 'chancre' ({šánkr—}) → ша́нкерный ({šánker#n—}); with {kl}, пу́кля, genitive plural пу́клей 'curls' (= бу́кли) for which Dal' gives the derived adjective пу́кольный, was the only example that could be found. Examples with the clusters {xr} and {xl} are of dubious validity in CSR: барахло́ 'trash' forms a derived substantive барахо́лка 'flea market', but since the base has no plural, one cannot assume that its stem is {baraxl—} rather than {barax#l—} (i.e., one cannot determine whether

one has to do with the alternation of {V} with {∅} or with
{#}); finally, махо́рка 'cheap tobacco' ({maxór#k-}) is un-
doubtedly derived from махра́, but since the latter is with-
out a plural, one is left in the same uncertainty as with
барахло́.

The cluster {kv} shows the same alternation as those
above, e.g., ты́ква, genitive plural тыкв 'pumpkin'
({tíkv-}) → diminutive ты́ковка (ʃtíkov#k-}); бу́ква, букв
'letter' ({bukv-}) → бу́ковка ({búkov#k-}); смо́ква 'fig' and
клю́ква 'cranberries' have no plurals but can, by phonetic
analogy with ты́ква and бу́ква, be assumed to have the stems
{smókv-} and {kl'úkv-} respectively, and form смоко́вница
'figtree' ({smokóvn'ic-}) and the diminutive клю́ковка
({kl'úkov#k-}). The same alternation appears in some de-
rived adjectives, e.g., ты́ковный beside ты́квенный,
клю́ковный (Dal') beside клю́квенный, but only бу́квенный.

The {∅} → {V} alternation is somewhat less frequent in
words not containing velars in the final cluster. The
group stop + liquid takes an "inserted" vowel in derivation
in several borrowed words, e.g., with {str}, маги́стр 'mas-
ter' ({magístr-} → маги́сте́рство and маги́сте́рский; мини́стр
'minister' → министе́рство 'ministry'; with {bl}, кора́бль
'ship' ({korabl'-}) → корабе́льный 'naval' and корабе́льшик
'sailor'; дирижа́бль 'dirigible' → adjective дирижа́бельный.

Other clusters occur only in isolated examples, e.g.,
бе́здна, genitive plural бе́здн 'abyss' ({bézn-}) → безздо́нный

({bezdón#n–});[14] пойма, genitive plural пойм 'area flooded in spring' ({pójm–}) → поёмный and поёмистый, both 'flooded in spring' ({pojóm#n–}, {pojóm'ist–}).[15]

Most of the above clusters have consisted of an obstruent stop followed by a non-obstruent of {v}. The alternation {∅} → {V} appears in a cluster of continuant + obstruent stop only in the two words служба, genitive plural служб 'service' ({slúžb–}) → служебный 'official' ({služéb#n–}), and тяжба (no plural, but presumedly *тяжб) 'lawsuit' ({t'ážb–}) → тяжебный 'legal' ({t'ážeb#n–}); the word усадьба 'estate' has two plurals, усадьб and усадеб, and forms the derived adjective усадебный, which therefore shows both the {∅} → {V} alternation like служба, служб, служебный and the {#} → {V} alternation, like e.g., свадьба, genitive plural свадеб 'wedding' adjective свадебный.

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[14] Incidentally, the {d} of this form provides an additional argument in favor of the theoretical framework adopted in this paper; note that there is no reason to posit a {d} in the flexional stem of бездна taken by itself since no form of this word's paradigm contains a phonetic [d]. Within the derivational system, however, morphophonemic {D} not only makes patent the "derivational history" of бездна (← без дна), but permits the generation of the derived form бездонный, with its flexional {d}; note also that there is no way to derive flexional {bezdón#n–} from the flexional stem of its base, {bézn–}. In other words, this group of words provides additional evidence that derivation operates at a level deeper than that of flexional stems.

[15] Both the derived adjectives were actually historically formed from the dialectal substantive поём, genitive поёма ({pojóm–}), which does not of course affect the fact that they are synchronically derived from пойма.

Examination of the above alternations in terms of dis-
tinctive features sheds a certain amount of light on the
regularities underlying the alternations. Thus, of the
two +consonantal segments interrupted by the inserted {v}
in derivation, the first is usually + compact, and the se-
cond either —compact (/kv/, /žb/) or not marked for com-
pactness (/kr/, /kl/, /gr/, /gl/). Furthermore, the first
consonant of such clusters is usually marked by more + fea-
tures than the second, and there where the number of + fea-
tures is equal, those of the first consonant occur earlier
("higher") in the feature matrix.[16] The only generaliza-
tion permitted by these observations is that the inserted
{v} tends to occur in clusters of decreasing feature com-
plexity.

6. CONCLUSION

This Memorandum has attempted to survey the vowel—zero
alternations in Russian flexion and derivation. It was
pointed out that the morphophonemic rules for vocalization
or reduction to phonetic zero of the vowel~zero morphopho-
neme in flexion differ from those in derivation, although
some generalization can be obtained at the price of intro-
ducing cyclical rules into derivational morphophonemics.

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[16]These remarks utilize the distinctive feature ma-
trix suggested by M. Halle, The Sound Pattern of Russian,
Mouton and Co., The Hague, 1959, p. 46. The nasality, con-
tinuant, voicing and sharping features, which clearly play
no role in the alternations being discussed, are omitted.

Of those alternations that are evident exclusively on the
derivational level, some are more nearly predictable on
the basis of flexional stems plus phonetic rules than
others, but it is suggested that all such alternations,
taken together, can best be described in a framework that
posits a derivational stem out of which the derivational
morphophonemic rules generate the several flexional stems
(of the base word and of its derivatives) of each word
family. The interrelation of these derivational and flex-
ional rules, insofar as they concern vowel-zero morphopho-
nemes and their representatives, can be shown as:

$$\{\%\} \overset{D}{\rightarrow} \begin{Bmatrix} \{V\} \\ \{\#\} \\ \{\emptyset\} \end{Bmatrix} \overset{F}{\rightarrow} \begin{Bmatrix} [v] \\ [\phi] \end{Bmatrix}$$

in which the large curved brackets enclose sets of choices
to be made on the basis of environments discussed in detail
in the foregoing.